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CONTENTS

DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with every copy of this week's issue.

Railways and the August Holiday

AN August holiday that varied in its weather in different parts of the country from drought to deluge had its effect upon the flow of railway traffic. The L.M.S.R., for example, reports that owing to weather conditions there was not the volume of traffic expected to Blackpool, Southport, and North Wales; on the other hand, exceptional traffic was dealt with to Scotland and Ireland. The sleeping car traffic, particularly on the Friday night, created a new record, no fewer than 1,500 beds (first and third class) being reserved out of Euston alone. The outstanding feature of the holiday, so far as the L.M.S.R. was concerned, was the large variation in the volume of traffic dealt with—heavy in the South, lighter in the West and North. Travel from the provinces to South Coast resorts showed itself to be popular. On the L.N.E.R., nearly 1,500 additional trains were run, duplication of services reaching its peak with the 13 portions required on the Friday for the traffic by the usual 10.45 p.m. train from Marylebone to the North-East Coast. A feature of the G.W.R. arrangements was the spreading of extra services from London over the Friday, Saturday, and Sunday, to give a chance for week-end and longer-period holiday-makers to separate themselves on the outward journey. Here again, cross-country traffic from the provinces southwards was heavy, so that 76 extra trains were run from the Midlands to the South and West Coasts on the Friday and Saturday. The Southern Railway experienced its usual rush to the sea, exemplified in our illustration on page 253, and during the week-end increased its always intensive electric services to the coast by 54 trains.

The Sunday Travel Habit

The express half-day excursions worked by all companies on Sundays must have helped to dispel the feeling that Sunday travel means slow journeys and poor connections. By such means the travelling public has been made ready to avail itself of new transport facilities offered on that day of the week, and the L.N.E.R. reports that its seven-hour Sunday Scotsman expresses between London and Edinburgh—introduced this summer—have been patronised almost to capacity. At the same time, it does not seem that traffic has been attracted away from the weekday Anglo-Scottish trains. Perhaps a certain amount of new patronage has been created among those who, being unable to leave by the morning Anglo-Scottish services on Saturdays, have hitherto travelled by road and spread their journey over Saturday afternoon and Sunday. Departures from King's Cross to the North and Scotland on Sunday, July 24, between 9.30 a.m. and 1.10 p.m., actually numbered eighteen, or only two fewer than in the equivalent period on an ordinary summer Saturday. Eight of these trains were half-day excursions, and two of them—the 9.30 and 9.35 to Newcastle—between them conveyed 1,100 passengers. The other ten were all trains which run on every summer Sunday.

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The Week's Traffics

As in the week of 1937 with which the comparisons are made, the period under review includes the opening days of the August holiday (up to Saturday on the L.N.E.R., but including Sunday for the other companies). Only the Southern and the G.W.R. improved their passenger traffics, and the Southern alone has a better total for the week, assisted by a gain of £2,000 in coal. The combined traffic results of the four companies for the week show a decline of £239,000, compared with a gain of £249,000 in the 30th week of 1937, but a year ago the comparison was being made between a holiday and an ordinary week. Aggregate takings of the railways for the 30 weeks are £2,593,000 behind their level a year ago.

	30th Week					Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total		Inc. or Dec.	
	£	£	£	£		£	%
L.M.S.R.	— 7,000	— 88,000	— 13,000	— 108,000		—1,065,000	— 2·82
L.N.E.R.	— 16,000	— 49,000	— 18,000	— 83,000		— 936,000	— 3·40
G.W.R.	+ 4,000	— 42,000	— 13,000	— 51,000		— 472,000	— 3·00
S.R.	+ 5,000	— 4,000	+ 2,000	+ 3,000		— 120,000	— 0·96

London Transport receipts gained £14,900 on the week, and are £34,700 up on the five weeks.

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The L.M.S.R. Interim Dividend Statement

The official statement issued by the London Midland & Scottish Railway Company states that in view of the serious fall in net revenue the directors have decided to make no interim dividend payment on the 4 per cent. preference stock (1923) or on the ordinary stock. Receipts for the first half of 1938 compared with the equivalent period in 1937 had declined by £959,000, while expenditure, due to increased rates of wages and prices of materials, was higher by £1,040,000, less decrease due to volume of traffic, etc., £503,000. The net decrease is thus £1,496,000, which represents a fall of over ten per cent. in relation to the 1937 net figures. The results show that the company was able to reduce about one half of its losses in gross receipts, by effecting economies. It remains to be seen whether an equivalent saving will be possible during the second half year. The wage increases were granted in the middle of August, and this will favourably affect the comparison, but as regards the saving on materials, much depends on the timing of forward contracts and on the directors' buying policy. The saving in respect of materials in the first half year has

created a favourable impression, but the prospects for the year are not promising, and current prophecy limits possibilities to 2 per cent. on the 1923 preference.

* * * *

G.W.R. Interim Dividend Statement

The half yearly statement issued by the Great Western Railway Company, with the news that no interim dividend is to be paid on the ordinary stock, came as an unpleasant shock. The earlier announcements of the disappointing results of the other railways ought to have softened the blow, but of course the Great Western case is aggravated by the fact that this is the first occasion since amalgamation that the company has passed an interim dividend. In past years, even when not earned, payments have been maintained, but with the present fall of £818,000 in net revenue on the half year, the directors have felt compelled to leave until the end of the year their final decision as to how far this policy may be continued. Receipts from railway and ancillary businesses have fallen by £306,000 and expenditure is higher by £522,000. The total decrease in railway receipts was £283,000, passenger train receipts being lower by £25,000, goods train receipts by £250,000, and miscellaneous by £8,000. No information is given as to what proportion of the increase of £522,000 is due to the rise in wages, but it is known, and it was expected, that the expenditure would be seriously inflated both by higher labour costs and by the increase in prices of materials. Much depends now on the traffics for the remaining half year and especially on the South Wales coal trade. In any case the comparison will be with a period of falling traffics last year.

* * * *

New South Wales Railways

The report of the New South Wales Commissioner for Railways for the quarter ended March 31, 1938, to the Minister of Transport of that State, shows that, in comparison with the corresponding quarter of the previous year, the Government Railways earnings increased by £360,971 and expenditure by £407,163. The number of passengers carried was greater by 2,724,406 and the train-mileage by 343,282. An improvement of £35,419 in coaching, and of £307,287 in goods earnings was recorded, the increased tonnage corresponding to the latter figure being 366,871 tons. Earnings from the sale of electrical energy were up by £18,265. Summarised, the following were the principal statistical results:—

Particulars	Quarter ended March 31 1938	1937	Increase
Mileage	6,124¼	6,124¼	Nil
Revenue	£4,863,090	£4,502,119	£360,971
Expenditure	£3,332,909	£2,925,746	£407,163
Train-miles run ..	7,475,894	7,132,612	343,282
Earnings per train-mile	13s. 0d.	12s. 7½d.	4½d.
Expenditure per train-mile	8s. 11d.	8s. 2½d.	8½d.
Operating ratio	68·53	64·99	3·54

Passenger and tonnage figures were recorded in our Overseas column last week. No very important open line works are reported, but a further length of Thermit welding of track equivalent to 14 miles of single line was completed during the quarter.

* * * *

The Irish Railways

The effect of rising costs of working showed clearly in the operating ratios of the Irish railways for the year 1937. In every case the proportion of the working expenses to the gross receipts exceeded 90 per cent., and on some of the smaller lines the earnings actually failed to cover the expenditure. The best showing was that made by the County Donegal Railways, with a ratio of 90·38 per cent. This system is worked under a joint committee representing the Great Northern Railway of Ireland and the London Midland & Scottish Railway. The Great Southern Railways, comprising the lines working in Eire, came next with a ratio of 90·71 per cent., and then the Great Northern, with 92·21 per cent. The Belfast & County Down, on its 80 miles of broad gauge, could do no better than 97·67 per cent., and the Northern Counties Committee made an even worse showing, with a percentage of 104·11. The smaller lines all recorded working losses, the Sligo, Leitrim & Northern Counties with 111·39 per cent., and the Londonderry and Lough Swilly with 116·94 per cent., while the Clogher Valley line of 30 miles narrow gauge, in its financial year ended September 30, 1937, worked at the exceptional rate of 235.92 per cent. The Northern Counties Committee, referred to above, is of course the old Belfast & Northern Counties line, acquired by the Midland Company and now owned by the London Midland & Scottish Railway Company.

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Railway History and Pottery

Railway pottery is a subject which is seldom written about or illustrated and yet it is one of considerable interest to those to whom the early days of mechanical transport appeal. That there is scope for the collector may be gauged from the fact that Mr. John Phillimore possesses nearly 100 different pieces, some specimens of which he has described recently in two interesting articles published in the columns of *The Connoisseur*. Much of this pottery is of Staffordshire origin, although examples in Liverpool and Leeds ware are sometimes to be found; the period from which most examples date is between the years 1830 and 1845. At that time mechanical locomotion was changing profoundly all aspects of life for every class of person in the kingdom, and railway commemorative pieces were naturally widely made and sold. Nevertheless, comparatively few examples have survived chiefly because such pottery was not in any way valuable at the time it was made, and it is mainly by accident that pieces have survived; moreover, a century of wear has not been conducive to the existence at the present time of uncracked and unchipped specimens. In this category of commemorative pottery mugs occupy the preponderating place numerically; bowls come next; and plates are rare. Mr. Phillimore has performed a useful service to both the collector and to the historian in placing on record these articles, which we cordially recommend for the attention of all interested in railway history .

* * * *

An Accident in Dublin

The slight collision, reported on page 259, which occurred on July 16 at the Westland Row station, Great Southern Railways, Dublin, between a train going to the west and one proceeding to Greystones, when some passengers were injured, reminds us how seldom we hear of accidents on the railways of either Eire or Northern Ireland. Curiously enough there was a buffer stop collision at Bangor, in the latter territory on the same day. Fortunately the train concerned, which was being propelled towards the buffers, was empty. In his interesting paper on signalling developments in Eire, read before the Institution of Railway Signal Engineers on October 14, 1936, and published in abridged form in our columns two days later, Mr. H. J. Guthrie, of the Great Southern Signal Department, pointed out the long immunity from fatal train accidents enjoyed in the then Free State, and we presume conditions are very similar in Northern Ireland. Signalling practice generally, throughout the island, is, of course, based on that obtaining in Great Britain, but some interesting pieces of special work have been put in, such as that done in conjunction with the singling

of the old M.G.W. main line, the working of which Mr. Guthrie fully described. Many years ago, however, Ireland was the scene of one of the worst accidents on record, that at Armagh on June 12, 1889, when 80 passengers were killed.

* * * *

Train Indication on the G.W.R.

It was in 1934 that the Great Western Railway adopted its present system of numbering long-distance trains, their reliefs, excursions, and Ocean Mail specials on summer Saturdays by means of large white numerals carried in a frame on the locomotive smokebox. All train numbers are composed of three figures, and an illustration reproduced in our issue of June 22, 1934, gave an impression of how readily the system of interchangeable metal plates, each bearing one figure in white on a black ground, allows a locomotive to be renumbered as necessary for its various duties during the day. On regular trains and their reliefs, the left-hand figure shows the division of origin; and the numbers of trains for which reliefs may be run are allotted so as to end either in " 0 " or " 5." For example, train No. 100 this summer is the 7.30 a.m. from Paddington to Kingswear, and No. 105 is the 8.30 a.m. from Paddington to Weymouth, thus leaving Nos. 101-104 inclusive available for reliefs of the 7.30. Where a train—such as the 10.30 a.m. from Paddington—is regularly timetabled to run in several parts on Saturdays, the first part ends in " 0 " or " 5 " as usual, and the remainder follow as described. All excursions and specials have " 0 " as their left-hand number.

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Effective Rebuilding of French 4-6-0 Locomotives

The efficacy of the rebuilding of four-cylinder compound 4-6-0 locomotives of the former French State Railways (described on page 250) was convincingly shown in recent trials of one of these engines in an experimental run between Paris and Le Havre, and also by a series of tests with a brake locomotive. With the latter the locomotive developed a drawbar horsepower of 1,200 at 74·4 m.p.h., whereas in a similar test before rebuilding this was only 600. At 62 m.p.h. the horsepower developed at the drawbar was 1,438 after and 806 before rebuilding, while at 50 m.p.h. the figures were 1,434 and 776 respectively. The Paris—Le Havre trial run was made with a train of four 35-ton lightweight coaches. It was possible to run the train on the usual schedule of the Bugatti railcars used on this route, the journey being made in 1 hr. 58 min. at an average speed of 74·4 m.p.h. On the outward run an interesting performance was put up by the engine on the 1 in 180 grade between Rouen and Motteville. Although checked to 34 m.p.h. by permanent way work at Malaunay, near the bottom of the incline, a speed of 68 m.p.h. was attained on reaching the top, about 12 miles farther on. Eighty-one miles between Paris and Rouen were covered at an average of 80 m.p.h. On the return trip from Le Havre a maximum speed of 64 m.p.h. was attained on a 1 in 125 gradient, 6 miles in length. These tests were made before the engine had been streamlined.

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X-Ray Inspection

Among non-destructive methods of testing materials none has made greater progress within recent years than radiographic inspection, and it is particularly applicable to a wide field in railway engineering. As described in this week's issue of our *Diesel Railway Traction Supplement*, it is of special assistance in the production testing of high-quality aluminium alloys, but in so far as railway work is concerned it is of even greater importance in the adequate inspection of welds, and on the German State Railway the radiographic inspection of certain types of weld is obligatory. Bridge welds are tested in this manner on the Reichsbahn, as described in Mr. Otto Bondy's useful book on " Modern Railway Welding Practice," and last year the all-welded plate girder railway bridge at Plaine-St. Denis, near Paris, was subjected to X-ray examination. Radiography is regularly used by some manufacturers as a check in securing sound welding, but it is not every joint which can be X-rayed. It is an invaluable aid in securing the highest type of construction, and for this reason it was introduced into the American Society of Mechanical Engineers' Boiler Code, which now requires the main joints of the drums of power boilers and of unfired pressure vessels for hazardous service to be radiographed. It is not always possible to obtain readily portable X-ray inspection apparatus, and in certain examples the use of radium capsules in conjunction with X-ray films has been substituted. However, there seems to be a consensus of opinion that owing to the short wavelength of gamma rays the sensitivity of this method does not approach that of X-rays.

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Rolling Stock and Track

In the discussion on a paper entitled " The Development of Passenger Rolling Stock," presented to the Institution of Locomotive Engineers, Indian and Eastern Centre, Mr. J. E. Barton, of the G.I.P.R., referred to the tendency of the vehicles to hunt or set up a rhythmic sideways motion. This tendency is not produced by the vehicle itself, and is usually associated with the track. In Mr. Barton's experience, short-spaced inequalities in the gauge on tangent track were the main cause. He advocated tests being carried out jointly by those responsible for the track and for the design of the coaching stock, and particularly suggested experiments in tightening the gauge on straight track to reduce the clearance between the running edge of the rail and the flange of the wheel to an absolute minimum. The gauge at points and crossings would of course have to conform to the standard at present laid down. Mr. Barton made the further suggestion that in the design of coaching stock the bogie centre pin might be offset laterally by a small amount, say not more than one inch, which would tend to give the same effect on straight track as is at present obtained on curves, and damping the hunting tendency.

* * * *

Writing on the Wall

In heat-wave weather the wayfarer on foot is thankful for the few seconds of shade afforded when walking under a railway bridge. But all too often nowadays his pleasure is spoiled by slogans chalked upon the walls, recalling him suddenly from the quietude of his reflections upon the beneficence of railway companies. How many times have we read in such circumstances that awful verdict, " Mr. So-and-so must go! " (naming a noted statesman). What might have been true and beautiful had the unknown author rounded off his phrase with, " Mr. So-and-so must go Great Western," becomes instead an oblique threat calculated to reduce Mr. So-and-so to extremes of terror and indecision, and making our flesh creep in sympathy. Still worse is the occasional chalked imperative, " Dissolve Parliament! " In this weather we feel that if there is any dissolving going on round here it will not be Parliament that suffers but ourselves who will be reduced by the heat to mere blobs of literary gelatine. Such inscriptions are of extraordinary persistence, and the only means of obliterating them permanently seems to be for the railway company owning the bridge to cover them up with large posters showing shareholders squandering their dividends at one of its resorts.

Colonel Mount's Annual Report

THE annual report for 1937 of the Chief Inspecting Officer of Railways, Lt.-Colonel A. H. L. Mount—the tenth to be issued over his signature—shows last year, like 1928, to have been exceptionally unfortunate in respect of casualties to passengers. In train accidents, properly so-called, which include collisions between trains; derailments; accidents due to, and failures of engines and rolling stock; and collisions with vehicles at level crossings, we find 49 passengers killed, compared with only 3 in 1936, and 1,007 injured compared with 497 in that year. These figures are the highest for 23 years, but were mainly due to the Battersea Park and Castlecary accidents, which between them accounted for 43 passengers killed and 258 injured. As we have frequently emphasised, only a relative value can be placed on statistics of this kind, for an accident may be a very serious one from the railway operating point of view, being accompanied by a grave breach of duty or the failure of some apparatus long looked on as most reliable, and yet attract little public notice owing to there being few persons in the trains involved. The number of railway and contractors' servants killed in train accidents in 1937 was 11, the injured amounting to 116, compared with 17 and 73 for 1936. The annual averages for the five years 1930-1934 were 9 killed and 84 injured. Casualties in respect of other persons were 10 killed and 22 injured, all the fatal and 14 of the non-fatal cases occurring at level crossings. Total casualties in train accidents were thus 70 killed and 1,145 injured; the five-year averages for 1930-1934 were 25 and 592 respectively, and the figures for the last exceptional year, 1928, were 72 and 895. Total train mileage was 456 millions, or 39·8 millions more than the average for the years 1930-1934; this must be borne in mind. Notwithstanding the regrettable increase in train accident fatalities in 1937, the high standard of safety to which we have become accustomed in railway working is, as the report points out, being maintained, and we have little doubt that we shall see still further general improvement when comparison is made over a term of years. The railway companies are fully alive to the wisdom of adopting the best equipment for safeguarding and facilitating their traffic, and, notwithstanding the need for economy, are constantly extending the use of track circuiting, light signals, and many lesser refinements which are steadily diminishing the liability to accident. Their action in this respect is indeed likely to be accelerated, and we are probably on the eve of important developments, extending to main line sections a degree of protection principally enjoyed hitherto on densely trafficked city and suburban lines.

Sixteen accidents were the subject of inquiry by the inspecting officers last year, 2 more than in 1936, with again 8 among them attended with loss of life. There were 7 derailments of passenger trains, compared with only 1 in 1936. In some of these cases the condition of the permanent way was below standard, and the desirability of the staff realising the necessity for early action in effecting renewals was drawn attention to in the official reports. In the Sleaford derailment high speed through a junction, considerably in excess of the authorised 20 m.p.h.—and actually witnessed again after all the publicity the accident received—drew special attention to the desirability of expediting the provision of speed indicators on locomotives, a course we have long advocated, while the importance of all instances of serious infringement of speed regulations being reported by the permanent way staff was also emphasised. The Barford accident, when a four-wheeled fish van, becoming uncoupled from a train travelling at 70 m.p.h. at night, was derailed foul of an adjacent line and struck by an express travelling in the opposite direction, which might easily have led to far more serious results than it did, raised the whole question of running such vehicles in fast trains. Colonel Mount, who himself conducted the inquiry in this instance, with Hallade oscillation tests, recommended that short wheelbase freight stock should in future be rigidly restricted to a maximum speed of 60 m.p.h., and the regulations regarding four-wheel vehicles in passenger trains be reviewed. These matters, the report states, are under consideration. The Sandal & Walton derailment was most unfortunate, a misunderstanding between a ganger and a lineman, during permanent way renewals, leading to one tongue of a pair of facing points being left totally disconnected. They moved under a train and derailed the last vehicle, which was dragged along on its side and flung round, two persons being killed. There was a similar derailment at Mold Junction, but no inquiry into it was thought necessary. An important feature of the goods train collision at Killamarsh was that evidence was fortunately forthcoming from an independent observer—a member of the public—to prove the enginemen's contention that a distant signal had been falsely showing " line clear " when they passed it. The wire had been allowed to become too tight with falling temperature and the signalman did not notice his repeater when he last worked the lever. The value of distant signal proving was brought out by this case.

The Battersea Park accident presented some unusual features; the

Particulars	Annual average, 1920–24		Annual average, 1925–29		Annual average, 1930–34		Year 1936		Year 1937	
Accidents to trains	1,009		941		796		908		819	
Accidents to or failure of rolling stock or permanent way	11,153		9,141		5,772		5,159		4,695	
Casualties—	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*
Passengers	92	2,577	91	3,733	74	4,394	65	5,758	110	6,380
Servants	248	3,518	210	3,267	183	2,592	212	2,753	189	3,043
Other persons	67	136	67	158	51	146	58	127	41	129
Totals	407	6,231	368	7,158	308	7,132	335	8,638	340	9,552
Passenger journeys, including estimates of those of season ticket holders (millions)	1,848		1,661		1,612		1,745		1,819	
Freight tonnage (millions)	322		320		288		301		318	
Net ton-miles (millions)	17,457		17,562		16,060		17,438		18,391	
Companies' servants employed (March)	707,574		680,197		603,621		586,935		601,080	
Passenger and freight train mileage (millions)	368·7		401·3		416·2		447·0		456·0	
All casualties per million train miles :—										
Killed	1·1		0·9		0·7		0·7		0·7	
Injured	17		18		17		19		21	

lock-and-block apparatus was of a special type to suit an electro-mechanical signalling installation, one of a small number of the design concerned, and the signalman, who became very flurried and confused, imagined the cancelling apparatus had failed when he attempted to free a signal slide that had become irregularly locked. He therefore unsealed the apparatus case and released it by hand, but, in so doing, inadvertently reset the block mechanism for another line, on which a train was waiting at a home signal. He had apparently momentarily forgotten this train and was led to accept another one, which ran into it. As colour-light signalling is before long to supersede the equipment, now 30 years old, the importance of the considerations involved is less than it would otherwise be. In the meantime the apparatus has been padlocked against access by any but the linemen. The Swanley accident showed how a failure to observe some special regulation might unfortunately coincide with the very mistake the latter was framed to guard against. a through train, being stopped out of course to take up passengers who had missed their regular connecting train, overrunning a signal at speed and being turned into a siding where it crashed into some vehicles and did much damage. The siding is now to be abolished under a remodelling scheme. The adequacy of telephone circuits in connection with the control of trains and requisitioning of breakdown gangs came under notice in this case, as well as that of emergency tool equipment at stations and on passenger trains.

The worst train accident of the year, however, was that at Castlecary. It was also the worst since the Gretna troop train collision in 1915, and has been exceeded for serious casualties only by one other, the notorious Armagh disaster of 1889, from which came the legislation that still governs British railway working in its leading features.* A lengthy inquiry was held into the Castlecary collision and the report on it issued as a separate document to the public, but from a quantity of evidence, very much of it contradictory or otherwise unsatisfactory, there came no conclusive proof as to the position of the down distant signal at Castlecary station on the night in question. It was unfortunately not repeated in the signal box. It was, however, a good working signal and its failure seemed unlikely, but two experienced drivers declared it was " off " for them. The signalman's failure to notice that the first train had stopped within station limits, his allegation that a track circuit or its indicator failed and misled him, and his wrongful acceptance of the second train, were peculiar features of the case, the story of which was told at some length in THE RAILWAY GAZETTE for June 24 last. Distant signal proving would have afforded proof of the position of the signal arm in dispute, had the drivers misread it, or prevented their trains being accepted had it not been " on." A.T.C. apparatus—or even cab signalling—would have warned the drivers, had the signal been indicating " on " correctly or " off " incorrectly, and recommendations were made that early decisions should be made concerning the application of warning A.T.C. equipment to high-speed trunk route services. Important developments in this direction are therefore to be expected, and, as we record on page 257, the L.N.E.R. has just decided to instal the Hudd system experimentally between Edinburgh and Glasgow. The effects of the collision were exceptionally destructive and the design of rolling stock was discussed in some detail; Colonel Mount, however, saw no reason for proposing that the railway companies should depart from their present practice as regards passenger coach design.

* The Tay Bridge accident is here regarded as being in a class apart

Speaking of the methods available for preventing accidents, the report says that in 13 of the 16 cases inquired into, recommendations were made. They have been wholly or partly adopted in 9 cases, not adopted in 1, and in the remaining 3 are still under consideration. Many other train accidents were dealt with satisfactorily by correspondence. Interlinking the distant signal with the block instrument would have prevented the Killamarsh—and possibly the Castlecary—accident, and A.T.C. of the warning type would have prevented them, or mitigated their effects, and the Swanley accident also. The train-stop type of control would have been effective at Crewe—where a train over-ran a starting signal in a fog—and control, in one form or another, might have been beneficial in 27 cases (excluding level crossing accidents) not inquired into and in which 20 persons were injured. The track circuit at Castlecary should have prevented that accident, but it did not lock the block instrument and dependence was placed on observing its indicator when accepting a train. Local track circuiting would also have prevented the Battersea Park accident.

It is very interesting to read that " with regard to the use of the Stop and Proceed Rule on lines in the London area which in the main carry passenger trains only, agreement has been reached with the L.P.T.B. and L.M.S.R. with regard to the provision of more powerful (electric) tail lamps for all new and existing rolling stock." There were 69 buffer stop collisions, an increase of 15 on 1936—which year saw 10 more than in 1935—with 207 persons injured, mostly shock effects. The calling-on arm was involved in 30 accidents, compared with 31 in 1936, resulting in 108 persons being injured, 45 in one accident alone. Accidents to trains of every kind totalled 819 in 1937, compared with 908 for 1936 and 796 for the five-year average 1930-1934. Accidents to, or failure of, rolling stock or permanent way amounted to 4,695, compared with 5,159 for 1936 or 5,772 for the five-year average. Failures of coupling apparatus were 3,634 with goods, and 767 with passenger trains, a marked improvement on 1936, which had 4,854 in all; chief liability to failure is still to be found in weakness of drawgear. The 34 accidents involving personal injury resulting from such failures all occurred to goods trains.

The report shows 34 persons killed and 27 injured at level crossings, a noticeable improvement over 1936; there are about 4,560 public road crossings, all but 200 provided with gates and attended. Out of the 23 accidents involving casualty 15 were due to lack of caution on the part of pedestrians or road vehicle drivers. Gatekeepers had failed to obey regulations in 3 cases, trainmen were at fault in another 3, and signalmen in 2. An inquiry was held into the Wick Lane, Wickford, case, where a train travelling at 65 m.p.h. ran down a motor-car. It was thought that the gateman was not mentally suited to his work and insufficiently instructed and informed. Colour-light signalling was being introduced on the section and control over the signals and gate interlocking was recommended and accepted. Of the above mentioned casualties, 25 deaths and 12 cases of injury occurred at occupation or footpath crossings. The report says that " the companies recently completed a valuable investigation in connection with occupation crossings, of which some 22,650 have thus been categorised. The recommendations which have been submitted on this contentious subject are receiving attention." The subject is indeed contentious, involving important legal considerations for the companies, while the increase in the use of heavy motor vehicles by persons sending traffic over many of these crossings makes it increasingly necessary to prevent collisions, which might easily be very serious for the railway trains. Colonel Mount is, however, able

to record that " despite the growth of road traffic, danger to the public using level crossings in this country is not increasing "; and further that " consideration is being given to the provision of traffic lights at certain heavily used crossings." Bridges and/or by-passes are replacing many crossings.

On accidents other than train accidents, we find 453 inquiries held, after which 258 recommendations were made; 204 were adopted, 27 not adopted, and 27 are under consideration. Many cases have been dealt with by correspondence. In the movement accidents there were 61 passengers killed and 5,373 injured; no fewer than 1,631 cases (7 fatal) were due to entering or leaving trains in motion, and 2,837 to opening and closing doors at stations; the great bulk of accidents in this general category is caused by want of caution or misconduct. The figures for door accidents are rising. The liability to accident by falling out of carriages was 1 to about 30 million passenger journeys, and the report says " there is no justification to warrant pressure on railway companies to adopt any automatic or other door control device." There were fewer servants killed in movement accidents, 178 against 195 in 1936, but more injured, 2,927 against 2,680. By far the greater proportion were genuine accidents, and over 83 per cent. of the fatalities were due to want of caution or disregard of rules. Only 3 deaths and 45 injuries were due to defective working or apparatus, or want of proper rules or appliances. Improvement continues in casualties to men working on the line, but is not what it might be owing to an increase in the casualties caused by want of care. " It is difficult," says Colonel Mount, " to legislate . . . but I feel that much can be done by good example and advice by gangers and others in positions of authority." Speaking of risks to staff generally he says " an inquiry was held in every instance when a man at work on the permanent way was struck . . . not only with the object of discovering and removing the cause of accidents but of taking the fullest advantage of these regrettable occurrences to impress upon the staff their responsibilities for preventing others." Coupling and uncoupling accidents are unfortunately higher than in 1936 and above the 1930-1934 average, both as regards fatalities and injuries. There is often a regrettable disregard of important rules in these cases, amounting to real foolhardiness.

The report expresses " considerable concern " at the recent increase in lineside mail pouch accidents. Within the 18 months ending January 21, 1938, three enginemen were killed and five injured by coming in contact with the equipment, due to wider cabs. It is apparently impracticable to alter the position of the lineside apparatus and it remains only to make it more conspicuous. The Postal Authorities and the railways have now fitted black and yellow enamelled plates as approach warnings in the rear, and lamps to illuminate them are to be provided. Two curious accidents occurred at Danby Wiske and Scrooby water troughs, when cab windows were broken by water overflowing from a passing locomotive. Stronger safety glass is being fitted to the windows and the water pick-up apparatus is being improved. A guard's van window was similarly broken on another occasion. The report also describes certain other accidents, some electrical, of a special kind; the value of first aid knowledge was brought out strongly in one of them.

There are many other figures and particulars in the report dealing with non-movement accidents of various kinds, over 99 per cent. of which are industrial accidents of a more or less non-preventable character. Attention was directed during the year to improving fencing at places where trespassing is likely to occur, on existing and new electrified lines. Satisfactory progress is being made. On page 236 we reproduce the usual table of casualties arising from all movements on rail, excluding trespassers and suicides, with comparative columns of annual averages and the corresponding figures of 1936. Colonel Mount concludes by referring to " what is being done abroad to facilitate staff education by circulating condensed accounts of essential facts relating to accidents, their causes, rules infringed, &c.," and suggests that " more advantage might be taken by the companies of their own staff publications." On page 244 we reproduce a typical example of such methods taken from the staff education magazine of the German State Railway. Colonel Mount's own summarised conclusions on his report are set out on page 258.

* * * *

Northern Railway of France

THE report for the year 1937 of the Northern of France Railway Company relates to the results of the last year of working by the company of its lines in France, the operation of which passed on January 1, 1938, in common and in accord with the other French railways, to the S.N.C.F. (the National Railways Company of France), under the terms of the Convention of August 31, 1937. Unfortunately this last working year not only showed no improvement over previous periods but recorded an even greater loss on working. Gross receipts increased by no less than 426 millions of francs, or 26·5 per cent., thanks to the influx of visitors to the Paris International Exhibition, to the re-establishment of certain tourist routes, and to the application during the year of increased tariffs. But this improvement in gross receipts was more than offset by the rise in working expenses, which increased by 632 million francs, or 38·6 per cent. This heavy burden is attributable principally to the new social legislation, and especially to the 40-hour law, imposed with a too brief period for preparation. The deduction from expenses in respect of the working of the Ceinture was 66,188,160 francs against fr. 58,699,503, in 1936. The Nord-Belge system—controlled by the Nord—which has lines 170 km. in length serving Liége, Namur, Dinant, and Charleroi, continued to show improved results, with a profit of fr. 11,509,058, against a loss of fr. 15,065,046, in 1936. The revenue account for the year's operations on the Nord system in France in 1937, after providing for the one-third share due to the State railways for the Amiens-Rouen line, and for the *prélèvement* of fr. 1,914,351, shows an excess of expenditure over receipts of fr. 231,971,802. After providing for financial charges the total deficit amounts to fr. 943,557,183, which is the amount to be required from the Common Fund, compared with fr. 598,964,203 in 1936. The dividend, provided in part from the statutory *prélèvement* and in part from the proceeds of the company's property account (*domaine privé*) was maintained at 70 francs for each 400 franc share as in the previous year. The figures in the following table refer to operations in France:—

	1937	1936
Passengers	124,059,867	117,958,505
Merchandise, tons (*charges complètes*)	53,861,836	46,341,395
Average haul, km.	136·1	131·5
Train-kilometres	61,168,036	57,188,344
Operating ratio, per cent. ..	111·38	101·65
	Francs	Francs
Passenger receipts	490,444,710	385,891,633
Merchandise receipts	1,472,239,428	1,159,277,461
Gross receipts	2,036,112,990	1,609,612,188
Working expenses	2,267,825,942	1,636,216,909
Loss on working	231,712,952	26,604,721

The remarkable increase of 27 per cent. in passenger receipts compared with an increase of only 5·2 per cent.

in numbers, owing no doubt to the increased tariffs. The percentages of first and second class receipts to the total were 7·35 and 23·25 against 6·86 and 22·23 in 1936. In numbers first class was only 0·5 per cent. of the total and second class 5·7 per cent. Finally, the report refers to the closing of a chapter in the life of the company. The past records may be regarded, it says, with pride. The Nord has served the country faithfully and well, particularly the regions of the north, where the development of industry has owed not a little to the efficient and unselfish aid of the great railway during nearly a century, under the guidance of eminent technicians whose names will not easily be forgotten.

* * * *

Railway Standard Charges

THE announcement that the amalgamated railway companies and the non-amalgamated railway companies to which schedules of standard charges have been applied, have filed an application with the Railway Rates Tribunal for the modification of certain of the charges in the schedules settled by the tribunal, following fairly closely the proceedings at the last annual review, has occasioned some little apprehension in certain quarters that the companies propose a further increase in their charges. This concern is without foundation as the following brief explanation will show. It will be recalled that in May last the tribunal found that the net revenue of each of the amalgamated companies was less than the appropriate standard revenue, and it therefore became its duty to make such modifications in the charges as it might consider necessary to enable the companies to achieve their standard revenues. On this point the railway companies intimated that the period during which the general 5 per cent. increase had been in operation (from October 1, 1937) had not been sufficient to enable them to express an opinion as to whether any further increase in charges would result in a material improvement in their financial position, and, for this reason, they did not lay any proposals before the tribunal. It was emphasised on behalf of the companies, however, that this decision had been reached in consequence of the comparatively short time during which the increased charges had been in operation, and must not be taken as precluding them from bringing forward proposals for increasing the charges before 1939 if, in their opinion, circumstances justified such a course.

A perusal of the terms of the present application, however, makes it clear that there is no ground for uneasiness on the part of traders, as the purpose of the proposed modifications is to maintain agreement between the scales of standard charges and the classification of merchandise for conveyance by railway. In the scales referred to in the application, particular articles of merchandise are named. These articles correspond to the groups, divisions or sections of the general railway classification as settled by the Rates Advisory Committee prior to the "appointed day"—January 1, 1928. From that date the Rates Tribunal has been empowered to make and, in fact has made, a number of amendments in the articles of merchandise specified in the various groups, &c., with the result that in certain respects the classification is now out of step with the headings of the scales of standard charges as originally settled. In these circumstances authority is sought to eliminate reference to various specific articles of merchandise in the scales and substitute appropriate references to the classification. Except in the case of letters for conveyance by railway, the modifications proposed do not affect the existing level of the railway charges. So far as letters are concerned, when the standard scales were settled by the tribunal the maximum weight of a letter for conveyance by railway was limited by the Postmaster General to two ounces, and a charge fixed accordingly. He has now issued new regulations authorising the railways to convey letters up to sixteen ounces in weight and the present application seeks authority to charge correspondingly higher fees for weight gradations in excess of the original two ounces.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Railway Station Gardens

51, Cleveland Square,
Hyde Park, W.2, July 25

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In the past few months many of the smaller railway stations throughout the country will have turned their attention to the annual competitions for the best kept stations. Many, admirably suited by their natural surroundings, will be hoping to attain first class honours; others, equally ambitious but less hopeful, will be satisfied with the smallest recognition merely to enable the good work to be carried on next year. The latter, strive though they may, can never aspire to anything higher than a fourth or perhaps a third prize. Why? They are situated in industrial or suburban areas; they have no wealthy neighbours from whom can be begged the necessary plants; all their beds must be made with pick and shovel, and all materials, such as bricks and soil, ordered from headquarters, and duly transported from wagon to platform after no few skirmishes with the operating and engineering departments. This, admittedly, takes place but once, but every year these beds must be filled, and for this the generosity of the station staff is relied upon. They may carry off a prize of £1 or perhaps £2, but it is barely enough to defray the cost, and certainly an inadequate compensation for the trouble and time expended. Meanwhile, year by year, they must watch the laurels borne away with grim monotony by the same entrants.

I do not wish to suggest for one moment that stationmasters enter their stations merely for the prize money, but their interest must be roused. As we all desire brighter stations therefore, especially the railway companies themselves, would it not be desirable to subsidise every one that announced its intention of entering the competition to the extent of, say, £1 beforehand? This would cover a great part of the initial expense, would immediately stimulate the interests of many more stations and there would be more competitors, with the result that there would be fewer foregone conclusions. Frankly, surely the railway companies, who are the only winners in the long run, should be prepared to foot the expense, rather than leave it to those who can ill afford it, and who at present bear the cost and do the work as well.

Yours faithfully,
J. S. OWEN

Gradients

Press Superintendent's Office,
M. & S.M. Railway Co. Ltd.,
Rayapuram, Madras, July 26

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Apropos your article on gradients in your issue of May 27, 1938 (page 1012), it may be of interest to you to know that the South Indian Railway ascends the Nilgiri Hills with frequent gradients of 1 in 12. It is, however, a rack-railway, the locomotives being, I believe, of Swiss make.

Yours faithfully,
D. F. PHAROAH

[A reference to "Steepest Gradients" in the "The Railway Handbook" mentions gradients as steep as 1 in 2 with rack and pinion on the Pilatus mountain railway in Switzerland, and 1 in 11 with simple adhesion on the Chamonix line of the P.L.M. (now part of the French National Railways).—ED. *R.G.*]

PUBLICATIONS RECEIVED

Transport in Lancashire. Manchester: The Manchester Chamber of Commerce, Ship Canal House, King Street. 9¾ in. × 7¼ in. 160 pp. Folding maps. Paper covers. Price 1s. net.—This is a record of the proceedings at the conference of transport held in Manchester on July 5, 1938, with the full text of the papers then presented, which we noticed editorially in our issue of July 8. The preface to the book explains the reason for the decision of the Lancashire Chambers of Commerce and the Lancashire Industrial Development Council to organise a conference to consider the internal communications of the county. There was no implied criticism of existing transport interests, and the conference arose out of a conviction that a community gets the kind of transport facilities it deserves, an expression which the Chairman said in his address might well be adopted as the slogan for the conference. The two committees desire Lancashire to possess "first-best" during the next ten years, which they think will be critical years; coal and cotton cannot be what they were, and other industries must be developed. The organisers of the conference imposed no limits on the writers of the papers and urged them to write frankly. They did not want the conference to be a battleground for inescapable rivalries, but they wanted enough plain speaking to reveal where the community of interest really lay, as it will be in that direction that they will wish to exert their action subsequently. The different aspects of the question of transport were fully dealt with by Mr. Ashton Davies, O.B.E., a Vice-President, L.M.S.R., in his paper "Railways and the Lancashire of Tomorrow"; by Major H. E. Hickmott, Managing Director, Ribble Motor Services Limited, in "The Development and Future of Lancashire's Road Passenger Transport"; by Mr. R. Stuart Pilcher, General Manager, Manchester Corporation Transport Department, in "Municipal Transport in Lancashire"; by Mr. C. Le M. Gosselin, President of the Commercial Motor Users' Association, in "Moving Merchandise by Road in Lancashire"; by County Alderman P. Macdonald, Vice-Chairman, Lancashire County Council, and Chairman, County Council Highways and Bridges Committee, on "Old and New Roads in Lancashire"; and by Mr. J. Bennett Storey, General Manager, Lancashire Industrial Development Council, on "Transport and Industrial Development in Lancashire." These titles of the papers presented show that the subject was fully covered at the conference, and in the course of the subsequent discussion, now published in full, the whole question of transport in Lancashire was thoroughly ventilated. Mr. Ashton Davies's paper, which had pride of place, gave rise to the interesting question of the possibility of constituting a passenger transport board for the Manchester district, modelled on the L.P.T.B. An inner tube railway was also discussed, but it appears that congestion on the roads is an even more urgent question. In this connection the statistics reproduced from Mr. Stuart Pilcher's paper are particularly interesting. Although the figures have often been quoted, it is certainly not generally realised that the number of motor vehicles licensed should have increased from 873,700 in the year 1921, to 2,938,485 in 1937, and that the expenditure on the maintenance of roads should have risen from £508,000 in 1921 to £1,302,000 in 1937, apart from capital sums sanctioned for improvements. The question of co-ordination, dealt with in more than one of the papers, came up frequently during the discussion, alternating with suggestions for a transport board, but delegates were advised to "avoid what has happened in Northern Ireland." From the viewpoint of the railway companies it was pointed out that low-grade commodities pass at rates possible only by rail transport and yet railway facilities are not being used to their capacity in Lancashire. Mr. Ashton Davies was asked to move the resolutions before the conference, and in doing so he said they had met that day to put Lancashire on the map. They could not see London spend 50 millions on new tubes, and sit down and do nothing. It was resolved, among other minor resolutions, to appoint a "standing committee on transport in Lancashire," and the full text of this and other resolutions is given. Finally, a verbatim report is appended of the speeches of the Rt. Hon. E. Leslie Burgin, Minister of Transport, and Lord Stamp, President of the L.M.S.R., who were the principal guests at the luncheon given to the delegates, as well as of the introduction by Mr. Francis Grundy, J.P., who occupied the chair as Lord Derby was unable to be present. In addition to the full text of the papers, the statistical appendices are reproduced, as well as the whole series of maps illustrating rail and road transport in Manchester and the county. A full list is given of the delegates to the conference.

Zwerftochten door den Balkan (Wandering through the Balkans). By S. A. Reitsma. The Hague, 1938: Moorman's Periodical Press. 9½ in. × 6¼ in. 132 pages. 5 maps, 156 photographs. Reprinted from *Spoor- en Tramwegen*. No price stated.—The author of this booklet, Mr. S. A. Reitsma (Editor of our contemporary *Spoor- en Tramwegen*) and his wife have clearly fallen under the spell of the Balkans and the Near East; last year they followed up their trip of 1936 by another further afield, to Constantinople, and, crossing the Bosphorous and Sea of Marmora, even a short way into Asia Minor. In these profusely illustrated pages Mr. Reitsma tells in his customary attractive style the story of this longer journey. Chapter II is of special interest to readers of THE RAILWAY GAZETTE, giving in 24 pages, with photographs and map, a comprehensive sketch of the development of the railway systems of south-eastern Europe.

New Sights of London. By Hugh Casson. London: 1938. London Transport, 55, Broadway, S.W.1. 6¾ in. × 4½ in. 54 pp. Illustrated. Price 6d.—This is a guide to the London of 1938, introducing the user to its modern architecture. The types of building to which his attention is directed range from churches to cinemas, stations, and factories, and he is helped to appreciate them by brief notes on what modern architects are aiming at in the various branches of design. Numerous illustrations and drawings provide the incentive for the reader to travel in London and its surroundings to see the places for himself, while there is material for many excursions in the classified list of some 700 buildings, every one shown with its nearest tube station or other means of access. The section of the guide headed "Power and Communications" commends, in addition to numerous Underground stations, two signal boxes to the reader's notice—namely the Southern Railway boxes at Surbiton, and Waterloo.

Non-Automatic Oil Switchgear.—An illustrated catalogue has reached us from Switchgear & Cowans Limited, of Old Trafford, Manchester, describing metalclad compound filled non-automatic oil-immersed switchgear. On certain switchgear layouts these switches can frequently be employed in the place of automatic circuit breaker equipments. To meet this requirement this firm has developed two forms of oil switches—a fixed pattern in which access to the switch is obtained by lowering the oil tank, and a withdrawable pattern in which the complete switch unit and tank can be isolated by lowering vertically, from which position the switch can be drawn forward and opened up for inspection. As their description shows, these oil switches are suitable for "making" and "breaking" in oil, current not greatly in excess of the normal rated currents of the units. They must, however, be capable of carrying through fault currents equivalent to the breaking capacity or making current of the associated oil circuit breakers. These various points were carefully considered by the manufacturers when designing this type of switch; and the result, as may be seen from the photographs reproduced in this booklet, is a robust and compact switch unit well suited to its purpose. These switch units can be used as non-automatic ring main equipments, as units for grouping a series of cables to a common busbar, or in conjunction with single busbar switchgear, for the purpose of sectionalising the main busbars.

THE SCRAP HEAP

HEARD ON THE SILVER JUBILEE

"Those blue engines? Oh, they're streamlined diesels. Same as ordinary engines, you know, but they burn oil."

* * *

ACHIEVEMENT

It would be well to spare a thought today for those who are working very hard so as to minister to our pleasure. Particularly, we might pay a mental tribute to the remarkable organisation of the railway companies, which have had to cater for extraordinary traffic conditions. About 3,500 more trains than usual are being run by the four great railway groups. From one popular resort alone 70 trains will, within nine hours, carry home 80,000 one-day or week-end holiday-makers. Figures like these give some idea of the problems which confront the railways. The arrangements are carried through smoothly and efficiently, just as though they had been rehearsed. We congratulate the railways on a job well done, and their staffs on their unfailing courtesy and good humour.—*From a leaderette in the "Daily Sketch" for Monday last.*

* * *

BERLIN RAILWAY CENTENARY

The hundredth anniversary of the establishment of railways in Berlin is to be celebrated this autumn. In this connection, the memory of August Leopold Crelle, mathematician and builder, is being honoured, for it was he who constructed the railway from Berlin to Potsdam, as well as many important roads. He was born in 1780 at Eichwerder near Wriezen, and died in 1855.

* * *

A Canadian Pacific Railway poster entitled "Hunt Big Game in Canada" recently won the grand award, and the award for the finest poster in the travel section, in an international competition held at the Rockefeller Centre, New York. The design showed a huge grizzly bear emerging from thick timber, and was the work of Mr. Tom Hall, of Montreal.

* * *

OLD REEF LANDMARKS GO

Another section of the Rand (South Africa) New Works programme has been completed, and a new deviation shortening the distance between Johannesburg and Germiston has resulted in the closing of the old section including two stations, Simmer & Jack, and Geldenhuis. These stations were named after Rand pioneers. The name Geldenhuis will, however, be perpetuated as it has been retained in the new station opened on the deviation. It commemorates L. Geldenhuis, an early gold prospector and member of the Volksraad for the Rand and, after Union, member of the Union Parliament for Vrededorp, Johannesburg.

IN A HIGHLAND RESTAURANT CAR

"What! Beef again!" the pilgrim cries
With pleasure shining in his eyes.
"Beef was my diet—roast, not raw—
'Twixt Inverness and Aviemore.
Today that dish of English birth
Beguiles my journey south to Perth.
Toil! distant engine, sounding busier
As we ascend to summits dizzier
And draw me on at solemn speed
Past station names I cannot read.
Here in this car, with beef before me,
I feel at home, you cannot awe me.
The landscape swells with barren humps
Devoid of comely petrol pumps;
The piquancy it lacks, of course,
I'll find in rare horseradish sauce
And dream I eat with ready throat
My daily City *table d'hôte*.
Consuming beef, I feel as one
With those whose happy courses run
Where Nature shows herself less stark
(As in the glades of Kilburn Park)
Or paints with artistry supreme
The verdant slopes of Kensal Green.
Yet, to perform its magic part,
Beef must be served with cunning art,
With Yorkshire pudding to excite
The chance reluctant appetite.
Thus, in a railway restaurant car
Beef is transformed to caviare."—

B. K. C.

One Hundred Years Ago

Extracts from the August, 1838, issue of "The Railway Magazine" (afterwards "Herapath's Railway Journal") and the oldest constituent of THE RAILWAY GAZETTE

Manchester & Birmingham Railway.—An Act of Parliament was passed in the session of last year, for the line from Manchester to Chebsey (a point on the Grand Junction, near Stone, in Staffordshire), with branches to Macclesfield, and to Crewe. . . . At Stone, forty-two miles from Manchester, commences the proposed extension to Rugby, at which place it will join the London & Birmingham Railway, and complete the communication between Manchester and London, passing through Rugeley, Lichfield, Tamworth, Atherstone, and Nuneaton, a distance of fifty-five miles.

Atlantic Steam Navigation.—The *Great Western's* second voyage occupied 14½ days out, and 12½ home. She started on her third on the evening of Saturday, July 21, with, we are informed, 118 passengers, and a large cargo of goods. This vessel is now paying well. In her second voyage out and home she is computed to have netted about £3,000 over and above her expenses. In her present outward voyage it is computed she will clear little, if any, short of £3,500 over her expenses, and, it is probable, as much home. The *Sirius* is transferred to the Petersburgh trade. She was merely an Irish pig-boat, and was put on the American trade as an experiment by that enterprising company, the British & American Steam Navigation Company. She was obviously too small.

Lancaster & Carlisle proposed Railway.—Mr. Locke's report is decidedly unfavourable to both the lines proposed by the provisional committees, one by way of Appleby, and the other by Kendal. He says—"It is evident, however, that either line will be very expensive, more so than is usual in such cases; it would, I think, be prudent to pause before proceeding to the execution of either line"; but is of opinion that a better and less expensive line may be selected by way of Shap.

Glasgow, Paisley, & Greenock Railway.—The width of gage (*sic*) recommended by Mr. Locke, *viz.*, 4 ft. 8½ in., is now adopted by unanimous consent, by both the Glasgow & Greenock, and Glasgow & Ayr companies, and there is little doubt but that on the Edinburgh & Glasgow line the same measure will be adopted. By this means when the railways are connected, as they shortly will be, an uninterrupted communication from sea to sea will be effected.

Manchester & Leeds Railway.—This company required about 267 yards of land belonging to the Roman Catholic School, called the Nunnery, near the station in the Oldham road. One estimated the damage to be £2,500, exclusive of the value of the land; another computed the total loss at £3,465 6s. 2d. The jury gave for land, £133 10s. 0d., for damage, £566 13s. 4d.; total, £700 3s. 4d.; being about £2,765 less than the conscience of one man thought it right to claim.

Railway Travelling.—One of the Birmingham directors started off with Marshal Soult on the 20th ult., at half-past four in the morning, reached Denbigh-hall, 47½ miles from London, returned to town, and was at breakfast 2½ miles from the station at nine o'clock the same morning. What would the ancients say to this?

Birmingham Railway.—This line is expected to be opened completely by September 10.

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

INDIA

Rolling Stock Programme for Financial Year 1939-40

The Railway Board's rolling stock programme for 1939-40, approved by the Standing Finance Committee for Railways, provides for an expenditure of Rs. 383·86 lakhs (approximately £2,876,000) on locomotives and boilers, carriages and wagons. The allotments include a special provision of Rs. 11 lakhs for 10 railcars for the Madras & Southern Mahratta Railway, which are intended for use on sections severely affected by road competition. Railcars already in service on this railway have proved very effective in counteracting bus competition.

The amounts provided under locomotives and carriages are just over Rs. 1 crore (£750,000) each, and the expenditure under carriages includes a provision of Rs. 49 lakhs for lower class stock. The programme provides mainly for the replacement of stock which has outlived its economic life and has already been condemned or broken up but not replaced. Out of the provision of about Rs. 174 lakhs for wagons, it is proposed to spend a sum of Rs. 125 lakhs on the purchase of 2,500 broad gauge general service wagons, almost entirely on replacement account. The approval of the committee was also sought and obtained for an advance allotment of Rs. 135 lakhs for the purchase of imported stores during 1939-40.

Strengthening of Railway Commercial Organisation

In connection with the recommendation of the Wedgwood Committee on the need for strengthening the Commercial Departments of the Indian railways, various improvements have already been effected on many railways, and the approval of the Standing Finance Committee for Railways has been obtained for additional gazetted appointments in the Traffic and Commercial Departments of certain systems.

Training in Railway Transport

The observations of the Wedgwood Committee in connection with the training of Indian youths for railway service have, it is understood, led to the contemplation by Calcutta University of the inauguration of an institute where students will receive special instruction in railway transport, railway economics, railway accounts and connected subjects. With a view to enlisting the co-operation of the railways essential for the success of the proposed institute, the Agents of the East Indian, Eastern Bengal and Bengal-Nagpur Railways and the Chairman of the Calcutta Port Trust have been included in a committee, with the Vice-Chancellor of the Calcutta University as Chairman, to draw up a constitution and a scheme of studies.

EIRE

Action for Demurrage

The enforcing of demurrage charges on Irish railways is a matter of serious worry for the railway authorities, especially owing to road competition. However, the Great Southern Railways Company felt compelled to sue Henry Wilson, coal importer, of Wexford, for £95 demurrage on railway wagons held under coal at Rosslare Harbour. The defendant's counsel submitted that when there was a dispute between the railway company and a trader it should be dealt with by the Railway Tribunal and that the Circuit Court had no jurisdiction. The Judge, however, held that there was no dispute until the action was brought and that therefore the Circuit Court had jurisdiction and the Railway Tribunal had no jurisdiction. A decree was given for the full amount, with costs.

DENMARK

A Variety of Cheap Excursions

During the last few years the running of excursion trains has become an important feature on the State Railways, and this summer as many as 44 excursions have been arranged; the administration has issued a booklet containing all particulars of these. They vary from day trips to eight-day tours and embrace all parts of the country. The tickets are issued at 50 per cent. reduction in fares, the normal rebate for return tickets being only 25 per cent. In connection with these excursions, arrangements are made beforehand with hotels and restaurants, and for bus trips, sightseeing, theatres, &c., at reduced tariffs, so that excursionists know what each all-in tour will cost when booking. These tours have been a great success and are now arranged regularly each year. Eight-day circular tours in various areas can also be made from any of the stations served, and the cheap tickets issued are available for express trains. Break of journey may be made at as many places as desired, and in addition each passenger can obtain, free of charge, a booklet with rebate coupons to museums and other places of interest. Similar tours are arranged in conjunction with the Norwegian, Swedish, and Finnish State Railways, giving roundabout tours of two, three, or four countries.

Another form of excursion in vogue is the mystery train, which is arranged by a newspaper in co-operation with the State Railways, trains being known as the "blue trains," which run out "into the blue" to an unknown destination. These excursions are made to forests, bathing places, &c., and have proved very popular, and are now arranged every year.

NEW ZEALAND

North Auckland Traffic Developments

By the addition of nine new trains and the re-scheduling of five others, a comprehensive reorganisation of train services in North Auckland has been effected recently. Traffic between Auckland and Kawakawa is rapidly developing and there is much increased goods activity on the Okaihau—Otiria line, which taps the important Kaikohe area. The service between Whangarei and Opua has also been improved, and a better turn-round of cattle and goods stock has resulted here and on the other lines in this district.

South Island Main Trunk Line

The most spectacular job involved on this work is in the construction of a large bridge over the Clarence river, between Kaikoura and Wharanui, at a cost of over £80,000. As on other sections of the line, good progress is being made with this work, which has been a race by the contractors against the natural menace of winter floods and frosts; but it is expected that the major task, the sinking of the caissons for the piers, will be completed in a few months, and that before long the erection of the steel superstructure will be put in hand. The substratum of the river bed was found to be so rocky that piledriving was impracticable, and so reinforced concrete caissons, weighing 200 tons apiece, are being sunk, and excavation under compressed air to a depth of 35 ft. below the surface of the river is necessary.

VICTORIA

Children's Nursery at Melbourne

The Government Railways children's nursery at Flinders Street station, Melbourne, has now been completely remodelled and modernised to cope with ever-increasing patronage, as is shown by the fact that the number of children cared for in the first year after its opening, June, 1933-34, was 8,700, whereas in the fourth year the total was over 19,000. Over 55,000 children have used the nursery since June, 1933, despite its being closed for 10 months due to cases of infantile paralysis occurring in the metropolitan area.

Situated on the second floor of the station building, the nursery, which is supervised by a sister-in-charge, is open from 9 a.m. to 6 p.m. from Monday to Saturday inclusive, and on all holidays except Good Friday and Christmas. The charges for each child are 6d. for the first and 3d. for succeed-

ing hours, with a maximum of 2s. a day, inclusive of extras.

A mother arriving in town for shopping brings her child or children into a spacious reception room—now gaily redecorated with animal figures in variegated colours—where is the office of the sister-in-charge, and if they are free from colds, &c., she takes them on into a cot registration room where a nurse records details of feeding times and other information. Small children are then placed in sound-proof cot-rooms, segregated from the play rooms where the older children can enjoy themselves. There are 43 cots, with which every modern hygienic precaution is taken and special soft lighting is installed.

A changing room is provided for older children, and there are open-air main and overflow playgrounds for them, where every kind of toy and amusement is provided, which like the whole nursery is disinfected every morning. Two large aviaries and an aquarium are innovations specially attractive to children of all ages. Separate parts of the open-air playgrounds are reserved for children of different ages, and as a dining room, specially provided with low furniture. At no time is a child out of sight of one of the staff, and an inter-room telephone system is installed. Special attention is paid to sterilisation. At 12.45 p.m. daily a suitable meal is provided at small charge for older children, and special milk—according to Infant Welfare standards—for infants.

Wind-chute Fencing for Drift Sand

Very satisfactory results have been obtained from experimental wind-chute fences erected to minimise the effect of drifting sand, and the system is to be extended. To prevent sand drifts on the track, open-bottom wind-chute fences of varying lengths have been erected, the materials used being old sleepers, timber and corrugated iron, and the average height is about 9 ft. The fences are at 8 ft. from the centre line of the track and slope outwards into the prevailing wind. Where there is cutting on the leeward side of the line this has been flattened out to allow the sand to get away more easily. A space of 3 ft. to 3 ft. 6 in. is left at the bottom of the fence, and the wind upon striking the inclined fence is diverted through this gap at accelerated speed, funnel-wise. As a result the sand is carried right across the track and swept clear. Delays to both passenger and goods trains have been considerably reduced by the introduction of this special fencing, and roughly 50 per cent. of the time previously occupied by the permanent way gangs in removing sand from the track has been saved by it.

FRANCE

Packing and Stowage Exhibition Train

The National Railways Company is now making a great effort to increase its goods traffic by encouraging better packing of goods for carriage by rail and better stowage in freight vans. For this purpose the company had a stand at the recent Paris Fair. These exhibits and many others are now to be shown in an exhibition train, which will start on a tour of France in September, stopping at 300 towns. It will travel for eighteen months or two years, and is expected to do good work in showing how to protect goods from damage.

FEDERATED MALAY STATES

Naming Locomotives

Of the 11 Pacific type locomotives now on order two are due to arrive at Port Swettenham (Malaya) about July 11, and a further 3 on or about July 20. With the concurrence of certain local rulers and the High Commissioner, it has been decided to name the larger or "S" class engines which normally work important passenger trains on this system, after local rulers and retired High Commissioners; some of the names are given below:—

Engine No.		Name
246	...	*Sir C. B. H. Mitchell*
247	...	*Sir J. A. Swettenham*
248	...	*Sir F. A. Swettenham*
249	...	*Sir John Anderson*
250	...	*Sir Arthur Young*
251	...	*Sir L. N. Guillemard*
252	...	*Sir Hugh Clifford*
241	...	*Sir Cecil Clementi*

It is also proposed in due course to name the "O" and "C" class engines, which are now on order, after the most important mountains, rivers or kualas (estuaries) in Malaya, and the names will be advised later.

Restaurant and buffet cars run on the important passenger trains will also be graced with popular feminine Malay names.

BRAZIL

Mogyana Railway: 1937 Results

At the annual general meeting of this railway held on June 2, the results of the previous year's working were reported. Receipts totalled 59,769 contos of reis and expenses 44,585, compared with 53,675 and 39,340 contos for 1936, giving a balance of 15,184 contos, or 848 more than in the previous year. The rise observed in expenditure was disappointing, but was accounted for by increases in staff wages as from January, 1937, and by the higher cost of material, under which heading fuel alone showed an increase of 2,409 contos. Labour costs, due largely to the innovation of various social laws, amounted to 4,324 contos, or 9·7 per cent. of the total expenditure. The contract with the Federal Government regulating the working of the line from Rio Grande to Caldas was renewed on March 24 in virtue of an Act of February, 1937.

In accordance with the convention of July 2, 1935, between the railway and its foreign creditors, the sum of 10,000 contos was set aside out of net receipts for the payment of interest charges, but in regard to this the directorate was doing everything possible to arrive at a definite agreement with a view to nationalising its foreign debts.

Balances and Traffics

At the end of the year the balances in contos of the different funds stood as follow: Reserve fund, 6,000; general improvements fund, 21,619; loan amortisation fund, 13,910; and 10 per cent. renovations and betterments fund, 33,759. A total of 3,413,070 passengers was carried during the year, against 3,157,581 in 1936, the corresponding receipts being 11,757 and 10,617 contos respectively; some 4,189 immigrants were carried free of charge. Luggage and parcels increased from 61,312 tons in 1936 to 67,135 tons, receipts improving from 3,116 contos to 3,568. Once again animal traffic registered a decrease, falling from 319,868 in 1936 to 316,655, with receipts 61 contos lower, but general merchandise increased from 1,461,327 tons to 1,650,485, giving an increase in receipts amounting to 3,311 contos of reis. Coffee tonnage increased by 36,824 tons, and receipts were 1,187 contos higher. Of the 7,704,180 bags of coffee received at Santos during the year, 1,672,437, or 21·7 per cent. were produced in the area served by the Mogyana Railway.

Fuel Problem

The growing shortage of firewood had led the railway to plant a further total of 715,000 eucalyptus trees at the Mogyana and Casa Branca (re-named Antonio Mercado) farms, making a total of 2,434,841 trees planted to date. In addition, a new farm had been purchased at a cost of 450 contos in the municipality of São Dimão.

The formation of a new Commercial Department in June, 1936, had been amply justified by the increased volume of traffic obtained, a great part of which was the outcome of a contract with the Cia. Mogyana de Transportes for joint rail and road services at special rates.

BURMA

Motor Inspection Trolly

In the Burma Railways signal shops in Rangoon a well-known standard 8-h.p. touring car has recently been converted into a motor inspection trolly. In addition to the substitution of flanged steel wheels for the road wheels—the same diameter being retained so as not to alter the gear ratio—a turntable jacking arrangement has been fitted. The front axle assembly remains unaltered except that toeing-in has been done away with, and the steering gear has been locked; its wheel and column have been removed. Stone guards or fenders have been provided to counter the mischievousness of small boys, who are so fond of placing stones on the rails in Burma.

PRESENTING THE FACTS ABOUT ACCIDENTS

The use of staff magazines for safety education is exemplified by the following typical example of an article from "Der Eisenbahnfachmann"

IN his annual report on railway accidents in Great Britain for 1937, reviewed in an editorial article on page 236, Lt.-Colonel A. H. L. Mount, Chief Inspecting Officer of Railways, draws attention to the practice, adopted on the Continent, of using staff publications to give publicity to the circumstances attending certain accidents and point out the lessons to be derived therefrom.

As a typical example of this we give below an extract from the German State Railway's staff education magazine, *Der Eisenbahnfachmann*, in which appear, from time to time, short accounts of accidents that have some important warning to teach. Names of persons and places are suppressed; only facts essential to a correct understanding of the circumstances being given, and diagrams provided when necessary, as in the present example.

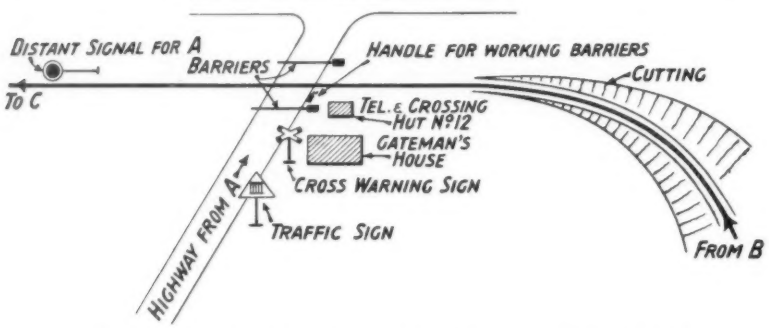


Diagram to illustrate circumstances of level crossing accident

Notice sheets giving similar information are circulated at intervals, being found very useful by those responsible for training new entrants to the service and examining candidates for promotion. The articles in the magazine appear under the general title of "Accidents which teach us a lesson" (*Unfälle, die uns eine Lehre sind*).

Serious Accident at a Level Crossing Through Failure to Close the Barriers

A goods train from B to C was due to pass the level crossing at gatehouse No. 12 at 8.46 p.m., according to the timetable. The crossing was equipped with the following:—

(*a*) A wire-worked barrier, operated locally from the position shown on the sketch.

(*b*) Cross shaped warning signs on both sides in accordance with Appendix A to the Railway Construction Regulations.

(*c*) Traffic motor vehicle warning signs on the road, 200 m. (219 yd.) from the crossing.

(*d*) Signal gong and telephone, in accordance with the regulations.

(*e*) Electric lamps and reflectors, giving a good light on the barriers at night.

On the day of the accident a temporary form of barrier was in use on the gatehouse side of the crossing, because the ordinary one had been broken through by a motor vehicle a few days before, so that the two barriers had to be worked in succession and not simultaneously. The temporary one was pulled down by a chain, and the other worked by a handle in the regular way. When the gateman stands at his proper place in front of the hut a train from B comes in sight at 300 m. (328 yd.).

The gateman came out of his hut about 6 minutes before the passing time of the train, got his handlamp ready and waited for the sounding of the departure gong signal from B. The distant signal worked from A, clearly visible to him, was then "on." While waiting he heard telephone calls sound between neighbouring stations and signal boxes and, leaving the barriers open, went and listened in on each occasion and obtained the impression that the goods train was late. The last conversation he overheard contained information from A to C that it had been offered forward. No good view of the line or the road could be had from the hut.

As he left the hut for the last time he saw the distant signal was "off" and the train in the cutting approaching fast. At the same moment he saw a bus nearing the crossing, but as there was insufficient time to lower the barrier he ran towards it, making the signal to stop with his cap. The driver himself saw the train at about 7 to 8 m. (23 to 26 ft.) distance but could not pull up in time and hit the locomotive in the side. The bus, containing 20 passengers, was flung round and damaged, a school child next to the driver was killed and 7 other persons injured. Little damage was done to the train.

This unfortunate accident necessitates our drawing particular attention to the following:—

(1) Barriers must be closed at the proper interval before a train is due. (Watchmen's Regulations: para. 7 (1).)

(2) As a guide to this the timetable applies in the first instance. It is the gateman's duty to station himself at his crossing outside his hut a suitable interval before the time given for the passing of the train and watch the line. He must not rely on the gong signal. (Same regulations: para. 7 (2).)

(3) If the view of the line is limited and the gong signal does not sound, special caution is imperative. The gateman must close his barriers in the prescribed manner, as above, and only then make enquiries of the station concerned about the running of the train. (Same regulations: para. 7 (3); third part.)

In this case the gateman thought he was sufficiently informed by listening in as he did, but this procedure was unreliable. By listening to telephone conversations not intended for him he was kept from closing the barriers when he should have done, and thus infringed clear and definite regulations.

It could not be conclusively established whether the signalman at B really had given the departure gong signal in accordance with Train Running Regulations, para. 16 (3) and 24 (12).

Britain's Foreign Visitors.—The Travel Association states that the official figures for June, issued by the Home Office, show that while there was a slight decrease in the number of holiday and business visitors in June of this year, compared with the same month for 1937, the figures for the first six months of 1938 show an increase of 5,575 compared with the first six months of 1936, although there has been a falling off compared with 1937, the Coronation Year. The total figure for holiday and business visitors for June was 40,425, compared with 43,273 in 1937. Holiday visitors from the U.S.A. in June totalled 11,333, against 14,329 in June of 1937. Holiday visitors for June, 1938, from the Scandinavian countries, including Denmark, showed an increase of 467 over June, 1937.

POWER SIGNALLING CIRCUITS

By H. C. TOWERS, A.M.I.E.E.*

AS an introduction to this article it is perhaps not out of place to recall that a track circuit is believed to have been put down in England at the Crystal Palace in the early sixties by the late Mr. W. R. Sykes. Credit is due to that inventor for the first proposed automatic signalling installation in this country, suggested for Victoria station on the District Railway. The late Mr. George Westinghouse designed a power frame in 1884 and it was installed at Bound Brook on the Philadelphia & Reading RR. Since these dates and until about 1920 power frames and their respective circuits were gradually improved. By the use of alternating current the a.c. track circuit with its attendant advantages was evolved. With comparatively few exceptions, however, the use of power interlockings and automatic signalling was restricted in Great Britain to the London Underground lines.

During the last decade or so the British main line railways have concentrated on the installation of power interlockings and automatic signalling, and, with the extensions that have been and are being made on the Underground system, the type of interlocking and the circuits employed have become steadily more involved and complicated.

The claims for power signalling operation are: (*a*) ease of operation, (*b*) ability to control a larger area from a central point, (*c*) remote control of interlockings several miles away, and (*d*) almost absolute elimination of the possibility of failure of the human element as far as enginemen or signalmen are concerned. Development along these lines has produced colour-light signalling, route signalling, speed signalling, train stop proving, relay interlocking, etc., with the addition of such adjuncts as improved train description.

Until recently the signal staff has been almost infallible in maintaining and installing this apparatus, and accidents which have occurred in automatic or power signal territories have been due to failure of the human element outside the department. This year, however, there have been two lamentable cases of collisions due to the failure of the signal staff, and any signal engineer actively concerned with the installation and maintenance of railway signalling in its many forms must have secretly asked himself "Are railway signalling circuits becoming too complicated?"

It is probable that a statement of this nature may rouse a storm of argument amongst signal engineers. The writer had occasion to discuss the above-mentioned accidents with one signal engineer who was of the opinion that this was the trouble with power signalling, and that there was something definitely tangible in a length of one and a quarter inch rodding and a run of stranded signal wire. To those who appreciate that under special conditions automatic and power signalling are the only solution for certain problems, this school of thought provides a stumbling block and one which, when met with in higher administrative circles, is an extremely difficult obstacle to surmount.

The original problem was to prevent the signalman from making mistakes, and this led to the introduction of power signalling and its attendant protective devices. It appears that the time is now approaching when it is necessary to make certain that the signal lineman shall not make a mistake the result of which may be much more disastrous than any which could occur on the operating side.

In almost every case power and automatic signalling is installed in busy areas, with the result that when a failure does occur it is almost certain that the lineman attending the fault will have his mind obsessed with the idea that primarily he must avoid delay at all costs. His mind being, therefore, preoccupied, he will not be as mentally alert as he should be, and the more complicated the circuit he has to deal with, the worse the position becomes. There is also the difficulty of a relieving lineman or a man who has just been posted to a new section and has not had the time to learn the circuits.

The present type of power interlocking requires a different type of lineman from that necessary a decade ago. Knowledge of Ohm's Law and elementary electricity is insufficient equipment. It is imperative that he should understand inductance, impedance, capacities, &c., and have the type of brain that will readily assimilate the many types of circuits in use today. In order to acquire this knowledge attendance at evening technical schools is necessary, and also at the railway company's signalling schools, where provided.

It would therefore appear that, in the case of a properly trained and efficient lineman, understanding alternating current technology and the various circuits he has to maintain, or may be required to maintain, he is a superior individual, speaking strictly technically, to the signalman. In most cases there is little difference between their scales of pay.

In stating this point, it is not intended to make out that an immediate adjustment of scales is necessary, but rather that as interlocking circuits become more complicated, more knowledge is required by the linemen and more responsibility is placed upon them; and the point referred to is bound to present itself sooner or later.

It is therefore felt that power signalling circuits should not be made unnecessarily complicated, and where complication is unavoidable, that special men must be placed in charge of them. The more wires there are placed on a relay, the more chance there is for a nervous man to make an error. Removable relay tops reduce this possibility to a minimum but do not cover cable or wiring renewals.

Criticism has often been levelled at some signal engineers, including the writer, for insistence on precise labelling of all wires, terminals, boxes, relays, cables, &c., and also in the proper preparation of wiring diagrams. It is felt that the small amount of extra time involved in preparing these facilities is well worth the trouble. While perhaps they may not be appreciated by the construction staff, they are certainly a boon to the maintenance man, particularly if he is new to the section.

The importance of thorough testing of interlocking circuits cannot be too strongly emphasised. Not only must testing be carried out after alterations, but also as ordinary maintenance routine. Instruction and training in proper methods of testing is essential for linemen and other staff. The signal inspectors on the railway with which the writer is connected submit monthly reports regarding routine circuit testing, and so important is this matter considered that large power interlockings are checked by the engineer in charge himself.

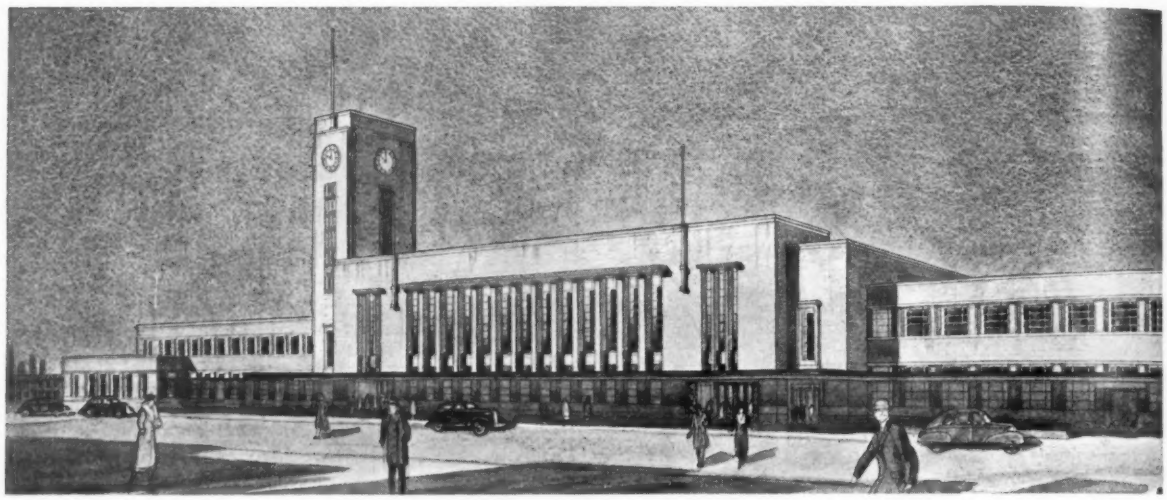
It would also appear that the younger members of the traffic staff should be required to take a more intelligent interest in the traffic side of signalling matters and the rules concerned. Traffic schools and examinations would assist in this matter.

* A Senior Signal Engineer, Bombay, Baroda & Central India Railway

NEW STATION FOR CHRISTCHURCH, NEW ZEALAND

Traffic congestion in and around the principal city of the South Island has necessitated the building of a new station, in the design of which have been incorporated very up-to-date conveniences

(*From our own correspondent*)



THE designs for the new station at Christchurch have now reached an advanced stage, and we reproduce the architect's drawing of the main façade. The building has a total frontage of 564 ft. and the maximum depth is 104 ft. It will be of the steel frame type, with reinforced concrete floors and roof, and the external walls will be of brickwork with a bluestone base and plaster dressings; the entrance features will also be faced with bluestone. Covering the entrances and the pavement in front of the centre mass of the building, there will be a cantilevered verandah 220 ft. long and 18 ft. wide, the footpath being set back under this verandah to give cover for motorcars arriving or departing from the station.

There will be three storeys in the centre, with two-storey wings finishing at the ends with single-storey extensions. The design is essentially modern, with large windows to all the offices so that the maximum natural light will be obtained. A monumental effect is given to the central feature by setting back the windows and obtaining deep piers between them, thus giving the effect of a row of columns. A large and imposing clock tower 104 ft. high contains the water tanks.

Each of the two main entrances will have six glazed bronze doors, communicating directly by broad lobbies, 28 ft. wide, with the concourse, which has an area of over 10,000 sq. ft. Opening from both of these entrance lobbies will be the booking and waiting hall, nearly 5,000 sq. ft. in area, with a ceiling height of 30 ft. Both the entrance lobbies and the booking hall will have their walls faced in marble for a height of about 13 ft., and all metal-work will be bronze. Round the booking hall will be grouped the ticket boxes, reservation office, ladies' waiting room, large enquiry office and shop. The ladies' waiting room, which has a lobby opening on to the concourse, is over 800 sq. ft. in area. Also opening off the lobby are the ladies' lavatories and bath rooms. Both the enquiry office and the shop open on to the concourse. The enquiry office is sufficiently large to accommodate tables where passengers may attend to their correspondence while waiting for their trains; telephone boxes, local and long distance, are also provided in this room. In the various parts of the building used by the public several more telephone boxes are provided.

Refreshment Arrangements

The south main entrance lobby gives access to the restaurant and the refreshment room and also has a door into the shop. Conveniently placed near the restaurant and refreshment room is the free luggage room. The restaurant, which has an area of 2,050 sq. ft., will seat 140 people in comfort and more in an emergency. The refreshment room has a counter 45 ft. long as well as ample space for tables; it covers 1,200 sq. ft. The kitchen will have all the latest equipment, and will be able to cater comfortably for the biggest crowds using the station. Together with its stores the kitchen accommodation is nearly as large as the restaurant and refreshment room. The balance of the southern wing is taken up with accommodation for the coaching foreman, porters and guards; an ambulance room is also provided in this end.

Luggage and Parcels Accommodation and Subway

Opening conveniently on to the north main entrance lobby is the checked luggage counter. The luggage and parcels space fills the whole north wing of the building, over 10,000 sq. ft., with counters for handling luggage and parcels totalling 140 ft. There are six loading docks. As trains arrive at both ends of the station and the luggage department is at one end, all the luggage from the southern end will be barrowed from or to the platforms through a subway under the building, so that the trucks will not interfere with the people congregated on the concourse. Lifts will be provided at each end of the tunnel to handle several luggage trucks at one time.

Storage rooms for old records, the heating chamber, ventilation chamber, and luggage-staff lavatories are in the basement under the northern end. At the southern end is a large bicycle store approached from the outside and connected up to the interior of the building by stairs. Under the centre portion of the building and approached from the concourse are the men's lavatories; all the public lavatories are to be air-conditioned.

Modern Offices, Heating and Ventilating, and Roof Nursery

The first and second floors accommodate the district railway offices, and they are approached by separate entrances adjacent to the main entrances, thus avoiding any confusion to the travelling public. Electric passenger lifts are provided to each office entrance.

There will be a children's nursery on the roof, in the centre of the building, similar to that at the new Wellington station, where the facilities provided have proved so immensely popular with mothers.

The building is to be heated by hot water radiators, and the public rooms are to be ventilated by mechanical means, the machinery for which will be placed in the basement.

The plans have been prepared by Messrs. Gray Young, Morton & Young, Registered Architects, of Wellington, and the erection of the building is to be supervised by Mr. W. H. Trengrove, Architect, of Christchurch.

A UNIFIED COLONIAL RAILWAY SERVICE?

Support for the principle of unification, providing flexibility is allowed so that different administrations can adapt themselves to local conditions in working on co-ordinated lines

By a Colonial railway officer with British and Colonial experience

THE two recent articles on a unified colonial transport service (published in THE RAILWAY GAZETTE of May 13 and July 15) raise a matter of considerable interest to all railway officials engaged in transport in the Crown Colonies and territories under the Colonial Office, and to those who are responsible for the provision of public services for the benefit of the people of the Colonial Empire. The question is not entirely new, but this is probably the first time that a definite scheme has been published.

In the first article a case was made for unification, and in the second the case against the proposal was put forward. Both articles rather stress the staff side of the proposal, but whilst as in all human endeavour the question of personnel is a very important factor, in this question it does not appear to be the main issue. Already the senior officers of Crown Colony railways are interchangeable and many junior officers are transferred from one Crown Colony to another, thus forming in some degree a unified service. Especially is this so if it is borne in mind that the general policy adopted by the Imperial Government in the administration of the Crown Colonies is towards the development of the indigenous races to take an increasingly active part in the management of their own affairs and public services. This means that, ultimately, overseas appointments will be confined to the supervisory posts, or as one Governor has put it "a strong but strictly limited British element to rule, direct, supervise, and guide." So that any unified scheme would probably apply only to the types of officials who are already interchangeable. The principle so far as staff is concerned seems therefore to be accepted, and it remains only to consolidate, and to deal with the questions of pay, conditions of service, pensions, and so on.

The object of this article is to examine, and indeed support, the proposal from another aspect. One of the greatest difficulties in the administration of the railways of the Crown Colonies, is the legal power under which they operate, and the financial relations between the railways and the State or Colony, often referred to as the commercialisation of the finances of the railway. An examination of the railway ordinances of Kenya and Uganda, Nigeria, the Federated Malay States, Ceylon, and Tanganyika show great divergences. Still greater divergence is shown in the financial regulations. The Kenya & Uganda Railways & Harbours form practically an independent commercial unit; the Nigerian Railway has been commercialised recently. In the recent report on the Ceylon Railway it was emphasised that many of the difficulties had arisen owing to the fact that the railway was not operated on a commercial basis. In Tanganyika the railway is partly but not completely commercialised. In all these territories the powers of the chief executive officers and their relations as members of the Government differ to a startling degree.

It cannot be said that the local conditions justify all these differences. It must be admitted that the governing constitutions of the territories differ, but on an important principle as to whether a State railway should be operated as a commercial unit, those best qualified to judge have no doubt. Yet it has needed a crisis resulting in a commission of inquiry to establish this principle in most of the countries where it has been adopted.

Reference is made in the previous articles to the reports of the general managers. Some attempt has been made in the past to obtain a measure of uniformity in the presentation of the accounts and statistics, notably by the Lambert Committee set up by the Secretary of State for the Colonies, but there was no enforcement of the recommendations and a wide divergence obtains in both. Some railways publish statistics on the American pattern, some on the British pattern. Some give full information, others very little. No one can be sure that a train-mile on one railway means the same thing on another, so that comparison, that spur to efficiency, is vitiated. It is not, of course, desirable that the reports of the general managers should be all of the same pattern, but with standardised accounts and statistics there is still plenty of scope for individuality in the writing of the report.

It does seem, therefore, that a case can be made out for some sort of unification. Whatever is done it must be an elastic organisation in which the general principles are fixed, but the details can be made flexible to deal with the administration under different forms of Government and to meet local conditions and requirements, as it is the local people who have to foot the bill, and a State railway must make as great an attempt to provide what the public wants as a commercial railway. What is re-

quired, therefore, is perhaps best described as a co-ordinated rather than a unified service, in spite of the criticism of the former overworked word.

How is this co-ordination to be effected? It is a help in considering this aspect to bear in mind all that has been done in co-ordinating the principles of Government in the Colonies with many divergent peoples; the co-ordination of the relationship and care of labour; soil erosion; locust invasions; medical services and hygiene; and many other technical services, not the least of which is the method of preparation of Government accounts and the Colonial financial regulations. The co-ordination and unification of these services were obtained through the Colonial Office, which strengthened its staff by the appointment of senior officials with technical knowledge of these subjects, and by the preparation of model ordinances and model instructions which place the onus on the local government to adopt them or to show good cause why they should not be applied and to suggest local modifications of detail. These technical officials maintain close co-operation with the local governments and officers by frequent visits to the territories, and by the encouragement of senior officials to discuss their problems when in England on leave. It is on these lines that the first steps towards co-ordination or unification should be taken.

It should not be impossible to find a suitable railway officer with executive experience in a Crown Colony or Colonies who could fill such a post with advantage to the Secretary of State and the territories. It may be argued that, in fact, the railways are controlled now by the Secretary of State. In theory that is true, but except in a few cases the railway view has first to be submitted to the local government and may never reach the Secretary of State, or if it does may be subordinated to other considerations which in the opinion of other advisers predominate. The advice of an independent adviser in the Colonial Office would ensure that purely railway considerations were placed in their true perspective.

The first duty of such an official would be to advise on the preparation of a model railway ordinance; the financial relationship of the railways and the State; to define the position and relationship of the chief executive officer and the Government; and to suggest model powers. It should then be possible to pass on to the vexed question of the relation of the State railway to other forms of transport, and here again model legislation would be a great help. As previously suggested, the standardisation of accounts and statistics would come under his purview, and it would be a duty to examine in detail the reports of the general managers, advising on experiments made, informing other Colonies, and preventing disastrous mistakes on one railway being repeated on another. From this it would be a comparatively easy stage to pass on to such standardisation of staff and conditions of service as were considered desirable, bearing in mind the divergences of the local conditions. It may be argued that such an organisation would be expensive, but such an argument can be disposed of if an examination is made of the cost of the various commissions which have been sent to inquire into Colonial transport questions within the last ten years and which should no longer be necessary. All reference to debatable details such as grouping, scales of pay, the use of a unified title (C.T.S.), has been eliminated from this article in order to throw into prominence the main principle. No reference has been made to technical questions, as a degree of co-ordination already exists through the technical departments of the Crown Agents for the Colonies, and it would be a comparatively easy step once the principle were adopted to strengthen this form of co-ordination.

On the staff side the main principle is that the conditions of service including the scales of pay must be such as to attract the best brains from the larger systems of Great Britain and the Dominions. In this the railway service differs from the other Colonial services, as it must attract men who are not beginning their career but have already obtained their qualifications and experience on larger railways and who must give up the permanent service and conditions of a large transport system to start afresh—a very important consideration which makes the recruitment of railway officers a difficult problem and one not usually appreciated sufficiently.

The officer appointed to advise the Colonial Office would not exercise executive functions of management so that the questions of centralisation or de-centralisation would not arise, and within this loose-knit organisation there would be plenty of scope for individuality on the part of local governments and local general managers. The final control would remain vested, as indeed it must, in the Secretary of State operating through the local governments. It does appear, therefore, that the proposal merits careful consideration in the interests of a public service designed to give service to the people of the Colonial Empire and to further their wellbeing.

4-6-2 TYPE LOCOMOTIVES L.M.S.R.

(*See illustrations opposite*)

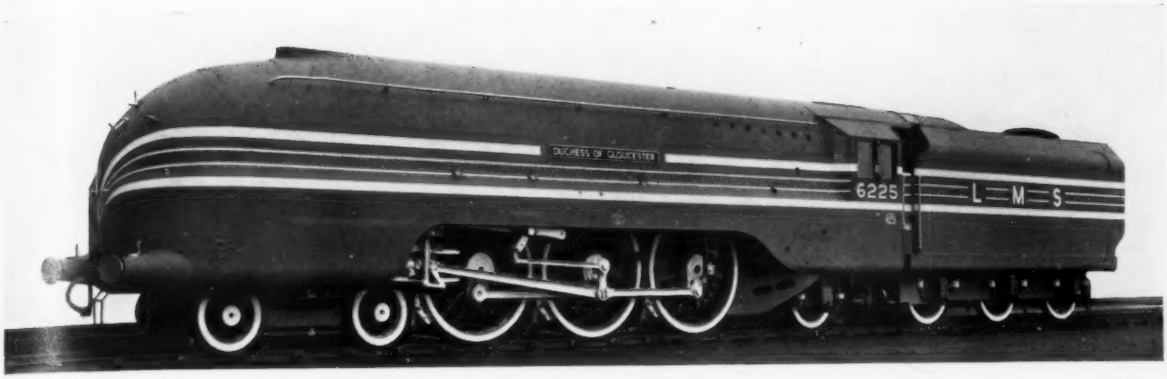
IN response to the frequently-expressed wishes of many of our readers, whose desire it is to have at their disposal in collected form particulars and illustrations of the latest streamlined and non-streamlined 4-6-2 type express locomotives on the L.M.S.R., we reproduce opposite photographs and drawings of these engines. They belong to the " Duchess " series recently turned out from the company's locomotive works at Crewe; the engines in both forms have been previously described in THE RAILWAY GAZETTE. The present is, however, the first occasion on which a dimensional drawing of the non-streamlined class has been reproduced. Comparisons are thus made conveniently possible, and it will be noted that whilst the general proportions are virtually the same in both cases, the outward appearance of the locomotives differs considerably. The difference between the total weight and axle loads in the two series is worthy of note; it shows that the streamlined casings add approximately 3 tons to the weight of engine as apart from the tender. To enable readers to refresh their memories on the subject, we append the following list of the names and numbers of the engines in each group:—

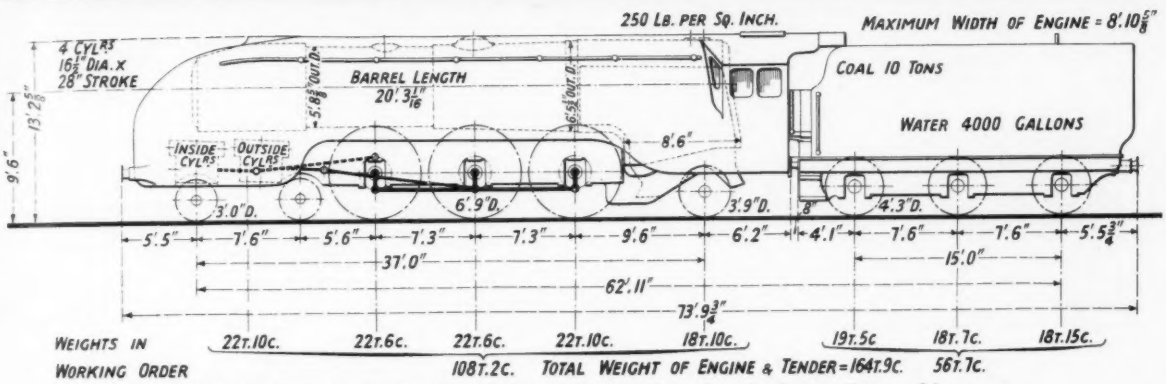
Streamlined engines

6225	*Duchess of Gloucester*
6226	*Duchess of Norfolk*
6227	*Duchess of Devonshire*
6228	*Duchess of Rutland*
6229	*Duchess of Hamilton*

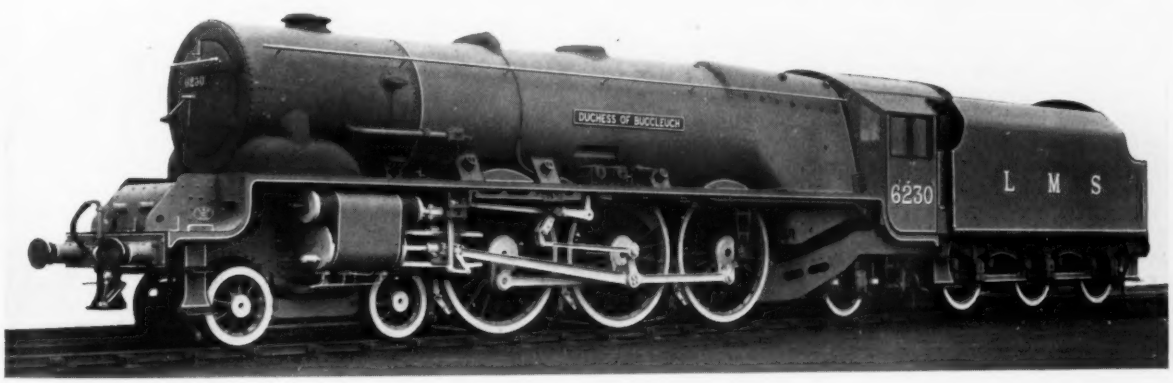
Non-streamlined engines

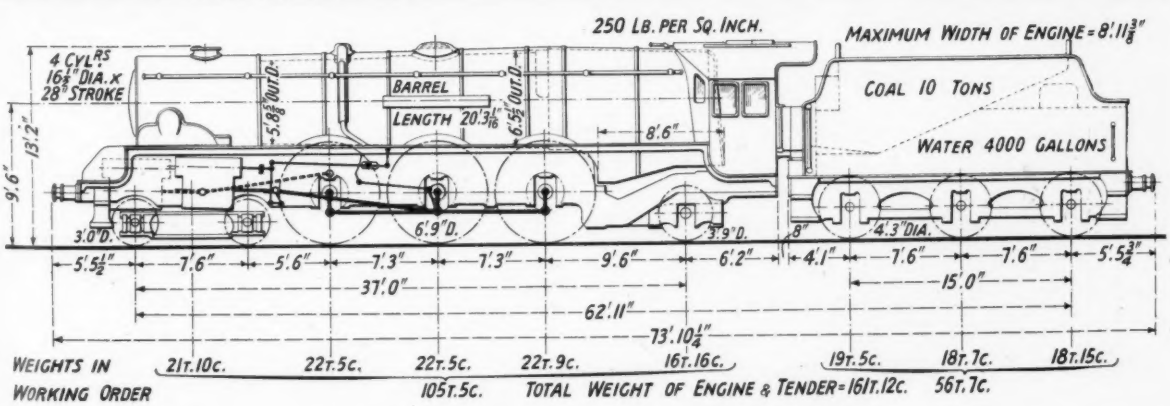
6230	*Duchess of Buccleuch*
6231	*Duchess of Atholl*
6232	*Duchess of Montrose*
6233	*Duchess of Sutherland*
6234	*Duchess of Abercorn*





L.M.S.R. streamlined Pacific of the "Duchess" series, built at Crewe this year



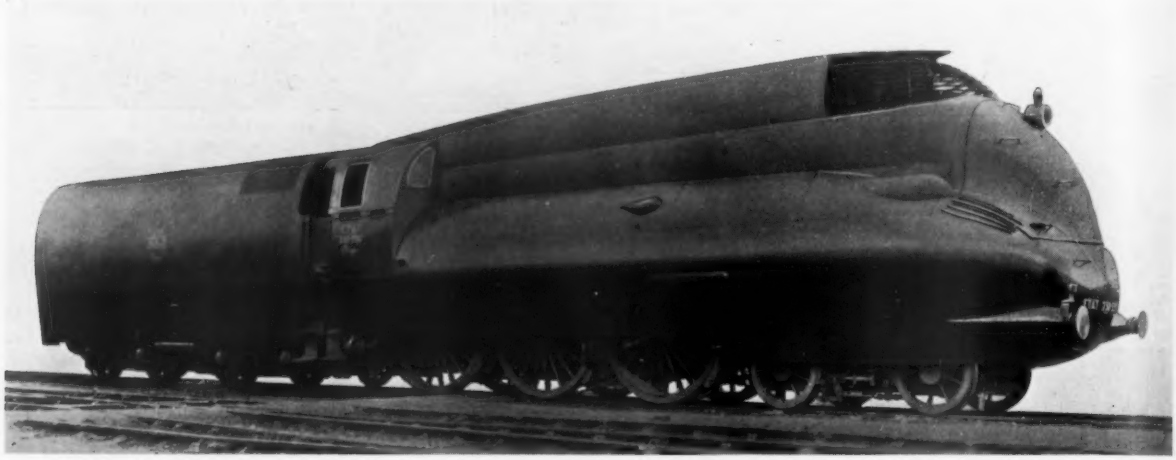


Non-streamlined "Duchess" series Pacific, L.M.S.R.

4-6-2 TYPE LOCOMOTIVES, L.M.S.R. (*See article opposite*)

REBUILT LOCOMOTIVES WITH WELDED CYLINDERS IN FRANCE

Four-cylinder compound 4-6-0 engines of the former French State Railways rebuilt with external and internal streamlining and welded cylinders

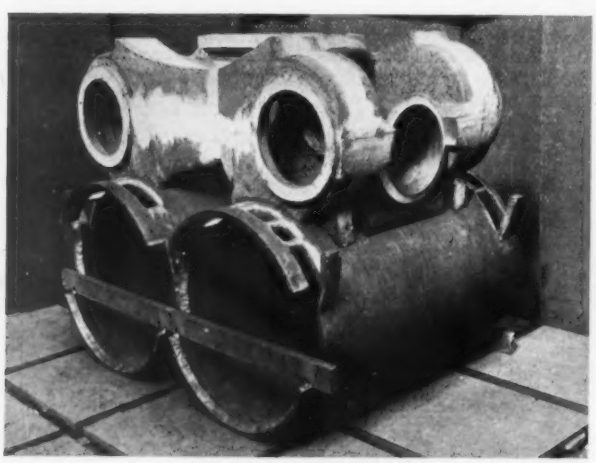


THE need of a locomotive to haul light, fast trains, led the former French State Railways to rebuild a number of old 4-6-0 type engines, originally built some 30 years ago. The reconstruction is of interest, not only because of the remarkable performance characteristics of which the locomotives are now capable, but also on account of the first use on so important a scale of welded cylinders.

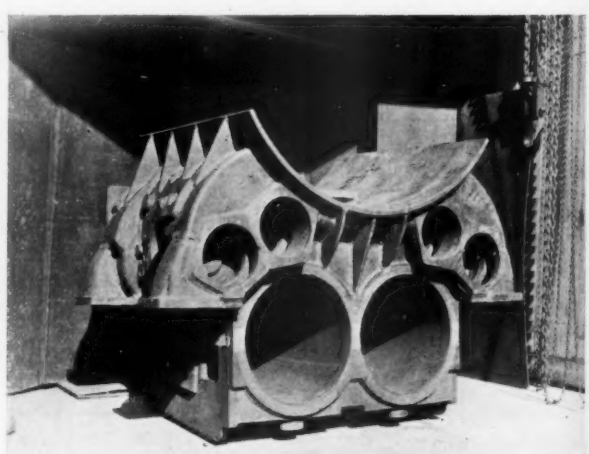
It is intended that the locomotives shall replace others of the 4-6-2 type for light trains, to do which the main problem was that of increasing their power output. The boiler pressure of the rebuilt locomotives is 210 lb. per sq. in., and the whole of the steam flow and distribution system and cylinders have been altered, Dabeg poppet valves being incorporated. The ratio of the volume of the high pressure to the low pressure cylinders has also been increased. The boiler has, moreover, been provided with an enlarged superheater providing steam at about 800° F.

A plan for making these cylinders in cast steel had been worked out by Société Dabeg, but as the time required for their manufacture was too great, this idea was abandoned in favour of fabricating by welding, after studying the results of two previous experiments in this type of cylinder construction. One of these had been carried out by the P.O. Railway in France,* and the other by the L.M.S.R. in England;† in neither case, however, had a completely welded construction been tried. The thickness of the metal was the same as that originally planned for the cast steel cylinders, and only for certain parts, in which welded construction presented extreme

* THE RAILWAY GAZETTE of January 28, 1938, page 178
† THE RAILWAY GAZETTE of May 18, 1934, page 878



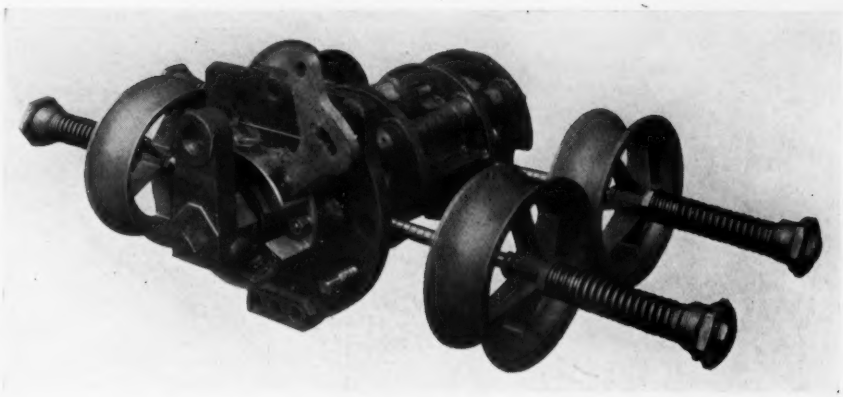
Welded cylinders and valves under construction



Welded l.p. cylinders and smokebox saddle

difficulty, was cast steel used, namely, for the ports of the low pressure cylinders, and for the admission ports of the high pressure ones.

The endeavour was to minimise stresses at the welds, and the whole was annealed after completion, so that such stresses as there were were largely removed; it was, however, considered important that they should have been virtually eliminated before annealing, so that there should be no danger of incipient fractures. The low pressure cylinders were divided for constructional purposes into several parts; the cylinders proper, the steamchest, the exhaust port, and the two-part cam case. Apart from these, the inside cylinder block includes the smokebox saddle. All these parts were built up separately so as to obtain easily accessible welds, and the whole assembly finally welded together. This form of construction, and the need for steam-tightness, led to the use of a cast steel exhaust port with a web on the surface which is in contact with the cylinder wall. The danger of leaks in the weld was thus reduced.

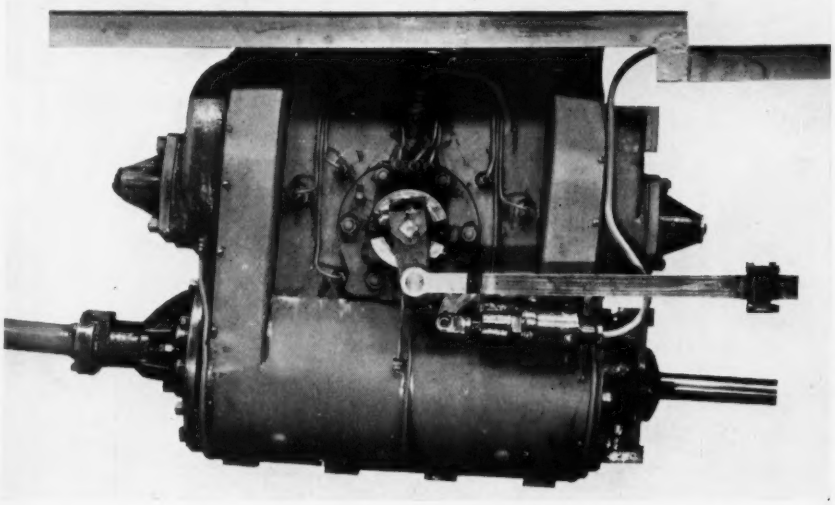


Dabeg poppet valve cam case and gear

It was considered advisable to machine certain of the parts before welding, not only to reduce the amount of machining required after completion, but also to reduce the risk of bad contacts between parts during welding. The various parts were cut out by oxy-hydrogen cutters, and any roughness removed by milling before welding. The assembly was carried out in sectional formation.

Thus the base of the cylinders forms one section, the cylinder walls with their connecting webs another, the cam cases a third, and so on. Every section was assembled and then tested to ensure that there was no deformation. The final assembly of the parts could then take place and the whole piece be machined in the ordinary manner.

The welding was done with a d.c. welding machine, and wherever possible with the pieces lying flat. The electrodes used were Fusarc 45. After welding, the whole was annealed at 650° C. This temperature was reached in five hours, maintained for two hours, and the piece then allowed to cool for 12 hours. The cost of the cylinders, of which only a limited number was to be made, was about half that of similar cast steel cylinders, and of a mechanical strength at least equal to that of the cast steel. The time required for the construction was about half what would have been needed for a cast steel cylinder.



Outside poppet valve cylinder of welded construction

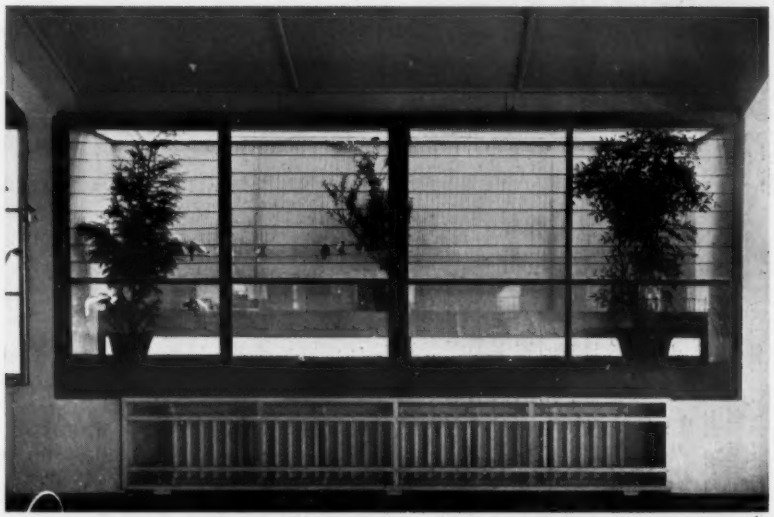
The Crookedest Railway in the World

Illustrations of the great Golden Gate bridge recently completed near San Francisco with Mount Tamalpais in the background, recall the fact that until 1930 a very remarkable railway was in operation and climbed to the summit of that peak, 2,600 ft. above sea level. This line was constructed in 1896 and was known as the Mount Tamalpais & Muir Woods Railway; it was of standard gauge, and 8·2 miles in length. The survey for it is said to have been completed with no other instrument than a hand level, and the total cost of construction and equipment is reputed to have been $147,000. But the most striking features of this curious little mountain railway were that it had no fewer than 281 curves, equivalent in aggregate to 42 complete circles, and including a " double bow knot " in which a rise of 100 vertical feet was accomplished in 2,000 ft. length with five spiral zig-zags. The longest straight between curves was a mere 413 ft., and the sharpest curve had a radius of only 70 ft. The average gradient was 1 in 20 and the maximum 1 in 14. Special Shay geared locomotives propelled the trains up this steep and tortuous line, the 8·2 miles being covered in about an hour. There were, however, also " gravity cars " that were allowed to run down the incline, controlled by double hand brakes, at speeds of 10-12 m.p.h. This unique railway was closed and sold by auction just eight years ago, according to the *Canadian National Magazine*.

Reception room with children's changing room leading to playground

Mothers' room where each mother can feed her baby in privacy

One of the sound-proofed cot-rooms for infants; there are over 40 cots



Aviary along one side of open-air playground; note the heating installation

RE-EQUIPPED RAILWAY NURSERY AT FLINDERS STREET STATION, MELBOURNE, VICTORIAN RAILWAYS

(*For description see Overseas paragraph on page 242*)

(For description see Overseas paragraph on page 242)

A scene in the concourse at Waterloo station, Southern Railway, during the past week-end. The notice over the timetable board reads "What you want and where to find it," but on this occasion the multitude was apparently inspired by a single desire—a train to the coast

Railway Veterans' Institute at Crewe

Right : Listening-in to the news

Below : A game of dominoes in progress

At Crewe there is a Railway Veterans' Institute, where retired engine drivers, engineers, and engine-shop workers enjoy the autumn of their life. Members include famous express drivers and builders of famous locomotives. The club was built and given by the L.M.S.R. and is supported by the employees in various branches ; no charge is made for membership. There is a total "clientele" of 1,200, and the oldest member is 93 years of age. A cup of tea may be purchased for a halfpenny. Games of snooker, billiards, bagatelle, draughts, and dominoes are available at all times. Concerts are given every week

Right : At Växjö, in the south of Sweden, the station has a double break of gauge, a most unusual feature. The photograph reproduced shows the goods transfer shed in the station yard. On the extreme left is a track and some wagons of the 2 ft. 11 in. gauge Växjö-Åseda-Hultsfred Railway. Next comes 2 ft. 11 in. and 3 ft. 6 in. mixed gauge ; the 3 ft. 6 in. line belongs to the Växjö-Tingsryd Railway, over which the better known Blekinge Coast Railway has running powers. On the right, at a slightly lower level, are the standard gauge lines of the Carlskrona-Växjö and Växjö-Alvesta Railways

RAILWAY NEWS SECTION

PERSONAL

G.W.R. Appointments

The Great Western Railway announces the following appointments:—

Mr. W. H. Victory, Chief Clerk, Chief Docks Manager's Office, Cardiff, to be Assistant to Chief Docks Manager, Cardiff, upon the retirement of Mr. J. H. Swallow, Deputy Chief Docks Manager, on October 24 next.

Mr. A. R. Beatt, Staff Clerk, Chief Docks Manager's Office, Cardiff, to be Chief Clerk, Chief Docks Manager's Office, Cardiff. Both appointments are to take effect from October 22.

The Secretary for Mines on July 29 announced that the following had been appointed members of the Coal Commission, formed under the Coal Act, 1938:—

Sir Ernest Arthur Gowers (Chairman); Mr. George Ponsonby Hyslop (Deputy Chairman); Mr. William Melville Codrington; Sir Felix John Clewett Pole; Mr. Joseph Jones.

Sir Felix Pole has been Chairman of Associated Electrical Industries Limited since 1929, and was General Manager of the Great Western Railway from 1921-29. He visited the Sudan in 1923-24 and 1930-31 at the request of the Sudan Government to report on the State-owned railways and steamship services. He is a member of the Coal Mines Reorganisation Commission.

Mr. W. E. Neil, Running Sheds Superintendent in charge of the Devon and Cornwall locomotive depots of the Southern Railway, with headquarters at Exmouth Junction, retired from the railway on August 1 after over 40 years' service. Mr. Neil, who began his career as an apprentice on the Great Western Railway, was in charge of the Gillingham depot until 1924, since when he has been at Exmouth Junction.

The South African Railways & Harbours Administration has decided to abolish the combined position of Assistant General Manager (Technical) and Chief Civil Engineer. Mr. W. A. Moyers has therefore been appointed Assistant General Manager (Technical), Headquarters, and Mr. J. M. Greathead succeeds him as Chief Civil Engineer. Mr. Greathead has been Assistant Engineer and Inspecting Engineer since the spring of 1935.

Sr. Salvador J. Romero, whose election by the Mexican railwaymen's syndicates as General Manager of the Mexican National Railways was announced in our issue of June 10, entered the service of those railways as an office boy in the Guadalajara Division on April 16, 1911. After holding various positions, he was in April, 1914 promoted to be Secretary to the Superintendent, which post he held until his transfer to the Express Department in June 1915. Sr. Romero was transferred to the Mechanical Department in 1916, and after serving there in various capacities was appointed Chief Clerk of that department in Guadalajara in April, 1919. He went to the Ferrocarril del Desagüe del Valle de Mexico as General Superintendent in 1933, but returned to the National Railways in the post of Assistant to the Chief of the Personnel Department on January 1, 1935. Sr. Romero became Chief Clerk to the General Manager on May 13, 1937, and took over the general managership himself on May 1 this year. The conditions under which the working of the National Railways has now been entrusted by the Mexican Government to the railway employees was the subject of an editorial in our issue of June 10.

Sr. Salvador J. Romero

Elected by the Mexican railwaymen's syndicates as General Manager, Mexican National Railways

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Vickers Limited announces that General Sir J. F. Noel Birch, G.B.E., K.C.B., K.C.M.G., has intimated his desire to retire from the board of the company, and that his wish has been acceded to with regret.

L.N.E.R. Appointments

The L.N.E.R. announces that consequent on the appointment of Mr. A. H. Peppercorn as Mechanical Engineer, North-Eastern Area (recorded in our issue of June 24), the directors have made the following appointments:—

Mr. G. A. Musgrave to be Locomotive Running Superintendent (Western Section), Southern Area.

Mr. C. H. M. Elwell to be Locomotive Running Superintendent (Eastern Section), Southern Area.

The L.N.E.R. also announces that the following appointments have been made:—

Mr. J. H. Hunter, Senior Assistant Solicitor, Edinburgh, to be Solicitor and Rating Agent (Scotland) in succession to Mr. T. B. Maitland, who is retiring from the service at the end of September next.

Mr. A. S. Buswell, District Passenger Manager, York, to be District Passenger Manager, Newcastle, in succession to Mr. F. C. C. Stanley, who has resigned from the service.

Mr. J. R. Sadler, Assistant to the Superintendent (Trains), North-Eastern Area, to be District Passenger Manager, York, in succession to Mr. Buswell.

L.M.S.R. Scottish Committee

The directors of the London Midland & Scottish Railway Company have appointed Mr. A. Murray Stephen, M.C., of Linthouse, Govan, Glasgow, to be a Member of the Scottish Committee of the company. Mr. Murray Stephen was educated at Cargilfield School, Fettes College, and King's College, Cambridge, where he took his degree. He joined the Army at the beginning of the war, was promoted to the rank of Major, won the Military Cross, and in the spring of 1918 was a prisoner in Germany. Mr. Murray Stephen is the Chairman of Alexander Stephen & Sons, the Linthouse shipbuilding concern, and is the sixth

Stephen in direct succession as head of that firm.

Mr. F. L. Smith, Accountant, London Midland & Scottish Railway. Northern Counties Committee, is retiring on September 30, and has been granted retirement leave as from August 1.

Mr. A. V. R. Brown, A.M.Inst.T., Assistant Divisional Superintendent at Bristol, Great Western Railway, has, as recorded in our issue of July 8, been appointed to succeed Mr. J. R. Morris as Divisional Superintendent at Chester. Mr. Brown entered the company's service in the Telegraph Department at Gloucester in 1901, subsequently occupying positions in that department at Basingstoke, Frome, Chippenham,

Mr. A. V. R. Brown

Appointed Divisional Superintendent, Chester, Great Western Railway

and Bristol. In 1905 he was transferred to the Divisional Superintendent's Office at Bristol, and four years later was appointed to the Divisional Relief Staff, and returned to the Divisional Superintendent's Office in 1915 to a post in the New Works and Accident Section. In 1924 Mr. Brown was appointed Yard Master and Passenger Agent at Avonmouth Docks, which position he held until his promotion to Weston-super-Mare as Stationmaster in 1926. In 1934 he was appointed to the position he now vacates at Bristol. Mr. Brown was the lecturer for the signalling classes at Bristol for nine years, and is an Ambulance Gold Medallist. He was a well-known athlete in his younger days.

From *The London Gazette* of July 22: Regular Army, Supplementary Reserve of Officers, Royal Engineers, Transportation: W. J. H. Stanier (late Cadet, Mill Hill School Contingent, O.T.C.) to be Second Lieutenant (July 23).

From *The London Gazette* of July 29: Regular Army, Supplementary Reserve of Officers, Royal Engineers, Transportation: Lt. H. G. Neale to be Captain (April 1).

INDIAN RAILWAY STAFF CHANGES

Mr. F. R. Hawkes, O.B.E., V.D., Chief Commercial Manager, N.W.R., and Chairman, North Western Transport Co. Ltd., whose portrait and biography were published last week, has been granted 2½ months' leave as from July 23, and is visiting England.

Mr. D. H. Hewitt, Officiating Deputy Chief Mechanical Engineer (C. & W.), G.I.P.R., has been granted 5¼ months' leave as from June 3.

Mr. O. G. Edwards, Controller of Stores, G.I.P.R., has been granted 4½ months' leave as from June 6.

Mr. S. H. P. Lincke has been appointed to officiate as Controller of Stores, G.I.P.R., as from June 6.

Mr. C. C. Baldwyn Dorman has been appointed a director of the El Oro Mining & Railway Company.

Mr. J. H. M. Shaw has resigned from the board of that company.

We regret to note the death, in New York, of Mr. F. W. Vanderbilt, the railway magnate, at the age of 82.

Sir Robert Burton-Chadwick has joined the board of British Airways Limited. He is head of Chadwick & Askew, shipowners, and was Parliamentary Secretary to the Board of Trade from 1924 to 1928.

We regret to record the death on August 2, at the age of 75, of Mr. Edward Robert Peaty, formerly Traffic Adviser of the London General Omnibus Co. Ltd.

We regret to record the death at Eastbourne of Mr. Harry Booth, O.B.E., aged 73. Mr. Booth became one of the first members of the Electricity Commission formed under the Ministry of Transport, and served with distinction on that commission until his retirement in 1925.

We regret to record the recent death, at the age of 66, of Lt.-Colonel Sir John Humphery, Chairman of the Proprietors of Hays Wharf Limited, and of several companies under its control. He was for many years a member of the Corporation of the City of London.

Mr. James Paterson (of Carter, Paterson & Co. Ltd.) has been elected as President, and Messrs. W. J. Elliott (Pickfords Limited) and D. Richardson (Gamman & Dicker Limited) as vice-presidents of a newly-formed National Conference of Express Carriers. This is to supersede the National Conference of Parcels Carriers, with extended scope as indicated in the title. The objects of the conference are to protect and advance the interests of vehicle owners engaged in the organised carriage of smalls and to agree on rates for the carriage of smalls and the conditions upon which they shall be carried.

Mr. William Harris Victory, whose appointment as Assistant to the Chief Docks Manager, Cardiff, G.W.R., as from October 22 (see page 255), entered the service of the Alexandra (Newport & South Wales) Docks & Railway Company, in the General Manager's Office, in April, 1901. The Alexandra Company was then the proprietor of Newport Docks and the railway in connection therewith to the South Wales coalfield. Mr. Victory was with the Alexandra Company, serving in several departments, until the amalgamation with the Great Western Railway in 1922,

Mr. W. H. Victory

Appointed Assistant to Chief Docks Manager, Cardiff, Great Western Railway

consequent upon the Railways Act of 1921. That period in the history of the Alexandra Docks was one of great development, under the forward policy then pursued by the directors. The docks were vastly increased, and a new lock entrance was constructed, which was opened in 1914 and was then the largest in the world. Mr. Victory was appointed General Manager's Secretary in 1912, and in 1915, Chief Clerk, Coal Shipping and Traffic Office. At the time of the amalgamation he was in charge of a section of the General Manager's Office of the Alexandra Company, and was appointed to the new Chief Docks Manager's Department, inaugurated by the Great Western Company at Cardiff, as principal clerk in the Commercial Section. Shortly after the amalgamation, he acted as Secretary to the Joint Committee set up between the company and the traders in regard to delays in coal shipments. In July, 1926, he was appointed Chief Clerk, Chief Docks Manager's Office. He represents the company on the Newport Harbour Commissioners.

Automatic Train Control on the L.N.E.R.

Hudd system to be installed experimentally between Edinburgh and Glasgow

The London & North Eastern Railway has decided to instal the Hudd system of automatic train control experimentally on the main line between Edinburgh and Glasgow. The company officially states that it has for some time been giving careful consideration to the question of A.T.C. and has kept in close touch with the experiments which have been carried out by the L.M.S.R. on the Hudd system. At the same time the system in operation on the Great Western Railway* has also been carefully studied. The section of line between Edinburgh (Waverley) and Glasgow (Queen Street) consists of 47 miles of double track and is specially suited for the experiment on account of both the density of traffic and the self-contained character of the engine working. It is proposed to equip the whole section and to fit 250 engines with the apparatus in the first instance.

The Hudd system is referred to by Lieut.-Colonel A. H. L. Mount in his recent report on the Castlecary accident.* It includes a non-contact induction apparatus, the function of which is to ensure that when a distant signal is passed at "caution," a horn is sounded in the cab of the engine and a partial application of the brake is automatically made, sufficient to bring the train to a stand before the home signal is reached. The L.N.E.R. has decided to experiment with this type of control in preference to the Great Western type, because it considers that recent improvements make an induction system of operation preferable to a contact system; importance is also attached to the fact that this system is being developed on the L.M.S.R. with which system the L.N.E.R. has a considerable exchange of mileage.

QUESTIONS IN PARLIAMENT

Shanghai-Nanking Railway

Mr. A. C. Moreing (Preston—C.) on July 25 asked the Prime Minister, whether he had yet received a satisfactory reply from the Japanese Government to the representations of His Majesty's Government that an opportunity should be afforded to the representatives of the British bondholders of the Shanghai—Nanking Railway to inspect the railway line and that the necessary measures should be taken to safeguard their financial interests in the line.

Mr. R. A. Butler (Under Secretary of State for Foreign Affairs): This matter will form, among others, the subject of a conversation between His Majesty's Ambassador at Tokyo and the Japanese Minister for Foreign Affairs, which has been arranged to be held during the course of the next day or two. Meanwhile my noble friend would stress the importance which he attaches to an early settlement of these questions.

Railway Employees and the A.R.P.

Sir Thomas Cook (Norfolk North—C.) on July 27 asked the Secretary of State for the Home Department, if he would make representations to the railway companies seeking an assurance that, in the event of national emergency, employees who were members of the St. John Ambulance Brigade should be at liberty for service with their divisions for the purpose of air-raid precautions.

Mr. Geoffrey Lloyd (Under Secretary of State for Home Department): My right honourable friend has been in communication with the railway companies regarding the possibility of their employees joining local authority A.R.P. services. Many railway employees are, of course, trained in first aid duties, but the requirements of railway operation in emergency may well be such that the companies will be unable to release their personnel for other duties during working hours. Subject to this consideration I am informed that the companies have no objection to members of their staffs volunteering for service with a local authority.

The Euston Doric Arch

Mr. E. H. Keeling (Middlesex, Twickenham—C.) on July 27 asked the Minister of Transport, whether he would ask the L.M.S.R., which was reconstructing Euston station with money guaranteed by this House, to comply with any recommendations made by the Royal Fine Art Commission as to the preservation and re-erection of the Doric gateway, which was of beauty and historic interest.

Dr. Leslie Burgin: I am not prepared to anticipate the outcome of the consideration at present being given to this matter by the various parties concerned or to urge upon the L.M.S.R. the adoption of a certain course regardless of other important considerations, including the provision of adequate traffic arrangements.

Underground Signalling

Mr. Bull (Middlesex, Enfield—C.) on July 27 asked the Minister of Transport what were the objects and principal features of the London Passenger Transport Board's new system of automatic traffic control on the Underground railways.

Dr. Burgin: There has been no change in principle in the signalling system in use on the board's railways, which embodies the automatic train stop. My hon. friend may however have in mind the system of control by automatic telephones being installed at Leicester Square station with the object of facilitating communication generally throughout the system.

Trespass on Electric Lines

Wing-Commander James (Wellingborough—C.) on July 27 asked the Minister of Transport whether he was aware that at an inquest at Mitcham on July 16, on a child electrocuted on the Southern Railway, the jury added to their verdict that they considered the company should take steps to make it impossible for any young child to get on to the line.

Dr. Leslie Burgin (Minister of Transport): I am aware of the jury's rider. I am informed by the Southern Railway Company that there was unclimbable fencing 5 ft. high at this place and that the child crawled through a hole which had been made in the ground under it. The company is providing concrete filling which should prevent children from going on to the line.

Parliamentary Notes

Railway Servants' Hours of Labour

A copy has been presented to the House of Commons of the report respecting proceedings under the Railway Regulations Act, 1893, during the year ended July 27, 1938.

End of the Session

Parliament rose on Friday last, July 29, for the summer recess after a session during which over 60 Bills were placed on the Statute Book. A measure which ultimately is expected to have widespread repercussions upon trade is the Holidays with Pay Act.

The unification of all coal royalties under State control and new provisions for the compulsory amalgamation of collieries are the main points of the Coal Act.

Royal Assents

The Royal Assent has been given to the following Acts: West Hartlepool Corporation (Trolley Vehicles) Order Confirmation Act, 1938; Ipswich Corporation (Trolley Vehicles) Order Confirmation Act, 1938; Newcastle-upon-Tyne Corporation (Trolley Vehicles) Order Confirmation Act, 1938; Gateshead and District Tramways and Trolley Vehicles Act, 1938; Brighton Corporation (Transport) Act, 1938; London Passenger Transport Act, 1938; and Holidays with Pay Act, 1938. In all these cases the date of the Royal Assent is July 29.

* See THE RAILWAY GAZETTE of December 31, 1937, and June 10, 1938

* See THE RAILWAY GAZETTE of June 24

Railway Accidents in 1937

Summary from Colonel A. H. L. Mount's annual report of the causes of deaths and casualties

Lt.-Colonel A. H. L. Mount's report on railway accidents in Great Britain during 1937, which we review editorially on page 236, concludes with the following summary of the incidence and causes of deaths and casualties among railway servants and passengers:—

Passengers.—The numbers of killed and injured in train accidents, Class I, were 49 and 1,007 respectively. They are the highest since 1915, and compare with the last exceptional year, 1928, when 48 passengers were killed and 716 injured. The corresponding figures for 1936 were 3 and 497, while the annual averages of killed were 7 and 18, and of injured, 467 and 579, for the two five-year periods, 1930-34 and 1925-29 respectively.

The numbers of killed and injured in accidents caused by, or connected with, the movement of railway vehicles, Class II, were 61 and 5,373 respectively. These figures compare with 62 and 5,261 for 1936, and with 67 and 3,927, the annual averages for the five-year period 1930-34. The numbers of injuries continue to rise, and these casualties are mainly due to misadventure, carelessness or misconduct on the part of passengers themselves. The principal causes are entering or leaving trains in motion, crossing the line at stations, falling off platforms and out of carriages, and opening and closing of carriage doors.

Servants.—The casualties in train accidents, Class I, 11 killed and 116 injured, compare with the previous year, 17 killed and 73 injured, and with the annual averages for the five-year period 1930-34, 9 killed and 84 injured.

With regard to casualties caused by, or connected with, the movement of railway vehicles, Class II, 178 killed and 2,927 injured, there was a decrease of 17 fatalities and an increase of 247 cases of injury, as compared with 1936; the annual averages for the five-year period 1930-34 were 174 killed and 2,508 injured.

Of the total accidents, Class II, the majority, 106, occurred when men (various grades) were working, walking and standing on the permanent way. This figure compares favourably with the improving averages of 140, 125 and 116 for the five-year periods 1920-24, 1925-29 and 1930-34 respectively. The number of men killed, however, during shunting operations, 42, was unfortunately 9 more than in 1936, and compares with 37 and 32, the averages for the five-year periods 1925-29 and 1930-34 respectively.

Other Persons.—In train accidents, Class I, all the fatalities, 10, occurred at level crossings, as the result of collisions with gates or vehicles. In connection with the movement of railway vehicles, Class II, 23 pedestrians, as compared with 33 in 1936, were killed when traversing level crossings, the majority of which were of public footpath type. The majority of the remaining categories (7 killed and 71 injured) occurred when those concerned were on business at stations or sidings. The total casualties, 170, were less than the previous year, 185, and there was a satisfactory decrease in the number of fatalities, namely, 41, as compared with 58 for 1936 and 51 for the five-year average 1930-34.

In train accidents, the liability to casualty in the case of passengers during the year was 1 killed in some 37 millions carried, and 1 injured in nearly 2 millions. With regard to servants in train accidents, the passenger and freight train-miles worked were about 41 millions per fatality and 4 millions per injury. Casualties, killed and injured, at public road level crossings roughly amounted to 1 per 190 crossings, an unusually low proportion, and takes into account pedestrians and servants (13 out of the total of 24).

Colonel Mount has also supplied us with the following details of passenger train fatalities for the years 1914–37:—

DETAILS OF FATALITIES IN TRAIN ACCIDENTS IN GREAT BRITAIN, 1914-1937

	Passengers	Servants	Other persons	Totals
1914 ...	6	8	—	14
1915* ...	251	7	—	258
1919 ...	3	7	8	18
1920 ...	6	5	3	14
1921 ...	18	11	3	32
1922 ...	5	4	12	21
1923 ...	3	9	7	19
1924 ...	24	8	10	42
1925 ...	1	14	19	34
1926 ...	13	2	17	32
1927 ...	27	2	7	36
1928 ...	48	15	9	72
1929 ...	3	14	2	19
1930 ...	1	4	9	14
1931 ...	8	13	13	34
1932 ...	4	3	9	16
1933 ...	6	11	8	25
1934 ...	17	12	8	37
1935 ...	13	7	10	30
1936 ...	3	17	17	37
1937 ...	49	11	10	70

* Up to September 30 only: no further figures published until 1919.

"The Iron Road"

A film entitled "The Iron Road," and based upon travel by L.N.E.R. streamlined trains, has been produced by British Foundation Pictures. The L.N.E.R. has co-operated extensively in the production, providing facilities for scenes to be taken at King's Cross station and locomotive depôt, on the Coronation train, and at numerous lineside points.

Being classed as a documentary and not an advertising film, "The Iron Road" has to avoid direct or implied references to specific train services; this accounts for some geographical inconsistencies in the journey portrayed which were remarked upon at a pre-view of the film given in the Crown Theatre, Wardour Street, London, on July 28. However, after the impression had been clearly created that the train is travelling north, it is curious to be shown Durham cathedral receding from the windows of a carriage clearly proceeding south. Nor was it apparent why the producer should place a scene as familiar as the Tyne bridges at Newcastle immediately before a view of the train arriving home again at King's Cross.

Driver Taylor of the L.N.E.R. is seen going to work, mounting his engine (to the accompaniment of the not very complimentary ejaculation, "Man! puny man!" from the commentator), and in the cab at speed. Light relief is provided by two imaginary passengers who are seen travelling and dining on the train, and enjoying the amenities of the Coronation observation car.

It is a pity that the main title of the film appears against an obviously "fake" background, with a signal arm facing the wrong way and impossibly wide sleeper spacing on the track. This is likely to prejudice enthusiasts in the audience from the start.

Greater London Electrical Advertising

Negotiations have now been completed between the London Passenger Transport Board and the London power authorities, whereby a concentrated publicity scheme will be begun shortly on the board's central buses, trolleybuses, and tramcars.

The contract concerned, which is for nearly £25,000, is unique, in that this is the first occasion on which the London power authorities (municipal and company) have joined forces to present to the public by attractive and telling advertising how, and why, electricity should be used for all domestic purposes. The majority of the municipalities and all the companies are interested. The scope of the appeal can be gauged by the board's traffic statistics, which for the year ended June, 1937, show that its road transport vehicles carried, on an average, more than 8½ million passengers a day in an area having a population of 9¼ million. On behalf of the authorities, the negotiations have been supervised by a committee of fourteen (representing company and municipal undertakings) under the chairmanship of Mr. A. E. McKenzie, M.I.E.E., M.I.Mech.E., Chief Engineer and Manager of the Borough of Wimbledon. Mr. G. H. Bittles, acting for Mr. H. L. Spratt, Commercial Advertising Officer, Road Transport, conducted negotiations on behalf of the London Passenger Transport Board.

STAFF AND LABOUR MATTERS

Railway Staff National Tribunal

The Railway Staff National Tribunal has issued its decision (No. 4, dated July 29, 1938) on the claims referred to it by the National Union of Railwaymen and the railway companies in regard to the rates of pay and conditions of service of signalmen. In a preface to the decision setting out the considerations which it has taken into account in its examination of the claim the tribunal states:—

It is obvious that any change in the remuneration of signalmen, of the order of magnitude involved in the union's claim, would make a considerable difference in the relative remuneration of this and other grades, unless similar changes were made also in respect of these other grades. It is also obvious that any general increase, of the kind proposed, would have a serious effect upon the general finances of the railway companies and could, therefore, only be considered on the basis of an examination of their whole financial position and prospects.

In the present case, however, the tribunal has had evidence before it only as to the work of one trade, the signalmen. It has had no evidence as to the character of the work of other grades, or the relation which the responsibility and strain of their work bears to that of signalmen. Nor has it been argued that the financial situation and prospects of the railways have improved since the last occasion (in July, 1937) when they were examined, in such a way as to justify improvement in the general scale of railway remuneration.

It follows from what has been said that the tribunal is not in a position to take any decision, in relation to the present case and on the basis of the evidence presented to it, which would either result in a substantial increase of the remuneration of signalmen as a grade which would affect their status in relation to other grades, or in a corresponding increase of the remuneration of all grades, which would have a serious effect upon the general financial position of the railways.

The tribunal has in these circumstances necessarily been limited to the consideration of comparatively minor adjustments which either further experience of the working of the marks system since 1922, or changes since that date in the methods, instruments, and organisation of the signalling service—with consequent changes in the strain and responsibility falling upon certain signalmen—have shown to be desirable and justified.

The various claims are analysed by the tribunal, which summarises its findings as follow:—

I.—Rates of Pay

(a) Signalmen

Where the average number of marks at any signal box is 500 or over but not exceeding 699, the rate of pay of the signalmen concerned shall be increased by 2s. 6d. a week.

Where the average number of marks exceeds 699 the rate of pay of the signalmen concerned shall be increased by a further 2s. 6d. a week.

(b) Traffic Regulators

A traffic regulator shall be paid 5s. a week higher than the rate of pay of the signalmen in the same box, but in no case is he to be paid at a rate of less than 80s. a week.

(c) Relief Signalmen

When a relief signalman relieves a traffic regulator he shall be paid at a rate 5s. a week higher than the rate of pay of the man he relieves, but in no such case is he to be paid at a rate of less than 85s. a week.

When a relief signalman relieves at a post for which the signalman's rate is the same as his own rate, he shall receive an allowance of 5s. a week, or 10d. for each turn of duty. When a relief signalman relieves at a post for which the signalman's rate is higher than his own rate, he shall receive the rate for the post, plus an allowance of 5s. a week, or 10d. for each turn of duty.

II.—Assessment of Marks

(a) Hand Generators

For each operation of a hand generator 4 marks shall be allowed.

(b) Levers operating more than one set of points

In cases where one lever moves more than one set of points, an extra mark shall be allowed The definition of "one set of points" is four blades or less.

III.—Signal Boxes in Automatic and Semi-Automatic Areas

The marks for work (excluding lever movements) performed in signal boxes in automatic and semi-automatic areas to be:—

Through trains.....	3 marks
Starting trains.....	1½ marks
Finishing trains.....	1½ marks

These marks are to be allowed only for trains in respect of which bell signals and/or train describers are in operation and are to include diagram reading. A train passing from an absolute block section to an automatic or semi-automatic section is to be credited as a "finishing train" under the National Agreement so far as the block section is concerned, and as a "starting train" so far as the automatic or semi-automatic section is concerned, and *vice versa* in the case of a train passing from an automatic or semi-automatic section to a block section.

In addition, one mark is to be allowed for each lever movement.

For each *time* entry in the train register book in respect of through, starting, or finishing trains, at boxes in automatic or semi-automatic areas ½ mark is to be allowed.

Any man employed in a signal box in an automatic or semi-automatic area which under the provisions of this clause is reduced in class, will retain his existing rate of pay until such time as he is offered a post carrying the same (or a higher) rate of pay.

IV.—Operations in Connection with the Working of Permanent Way Motor Trollies

For the purpose of assessment of marks, permanent way motor trollies shall be regarded as trains.

Except as provided above, the National Agreement dated May 1, 1922, is to continue to operate.

This Decision (No. 4) shall be operative as from the beginning of the first full pay period following the date hereof, July 29, 1938.

The tribunal states that it realises that some little time must elapse before the retaking of marks which will be involved can be complete and it makes provision for any increases which are shown to be due on such retaking of marks to be paid restrospectively as from the date of the decision.

Railway Collision in Dublin

(*See editorial note on page* 234)

On Saturday, July 16, the second portion of the mail train to the West of Ireland left Westland Row at 7.45 a.m. and collided on the bridge outside the station with the 7.40 a.m. from Amiens Street to Greystones. Since the closing of Broadstone, trains to the West of Ireland start from the up platform at Westland Row in order to provide facilities for passengers in the way of waiting and refreshment rooms, lavatories and other amenities which are not available on the platform for the up line to Amiens Street. The trains for the west, therefore, face towards Amiens Street on the same line as that on which the local trains from Amiens Street normally approach, and the outgoing west trains cross from the down to the up line some little distance outside Westland Row and beyond the bridge over that street.

From the direction of Amiens Street the home signal for Westland Row is fixed at Tara Street, which is about 500 yd. from Westland Row station. When the points for the crossover road are set for an outgoing train from Westland Row to the west, the electrically-controlled signal at Tara Street must be at danger. In this case the local train left Tara Street for Westland Row before the outgoing train had cleared the crossover road and investigation will reveal the cause of this. The lines between Westland Row and Tara Street are track circuited.

Fortunately both trains were going slowly when they met, one having only just started. There is a curve at this point and a clear view would possibly have prevented the occurrence. A few passengers suffered slightly from shock but refused medical assistance, and apparently quickly recovered. Owing to the position of the accident, which was actually on the railway bridge outside Westland Row station and over the street, it was a considerable time before the line was cleared, yet, except for delays in the morning to the local trains, during the time single line working was in operation, there was little inconvenience caused.

NOTES AND NEWS

Collision on Paris Metro.—Two trains collided at Combat station on the Paris Metro on Saturday evening, July 30. Twenty passengers are reported to have been injured.

Iran Railways.—Last week (on page 229) we recorded the hope that the Trans-Iranian Railway will be completed within the next three or four weeks, and the suggestion that work on a link from Teheran to Tabriz may be begun shortly. It is now reported from Kashan that, to facilitate gold and copper mining, a branch from Qum (on the Trans-Iranian line) to Kashan and Anarek is being planned.

Dundee West Station, L.M.S.R., Reopened on Sundays.—Since July 24 Dundee West passenger station is being opened on Sundays for all L.M.S.R. ordinary and excursion trains, which hitherto have originated and terminated at Tay Bridge station. Trains originating at Arbroath and other Dundee and Arbroath joint line stations on Sundays will continue to call at Dundee (Tay Bridge) as formerly.

Rome-Naples High-Speed Electric Service.—The first official run of the new Rome-Naples high-speed electric service on the Italian State Railways was made on July 27, when the inaugural train was started from Rome by Signor Benni, the Minister of Communications. Naples was reached in 1 hr. 24 min. for the journey of 130½ miles, and the return trip took 1 hr. 36 min. As recorded in our issue of June 17, the service is scheduled to take 1 hr. 30 min. in each direction.

Parsons Memorial Lecture, 1938.—The Institution of Mechanical Engineers, which this year is responsible for the arrangements for the above lecture, has invited Mr. Stanley S. Cook, F.R.S., M.I.Mar.E., of the Parsons Marine Steam Turbine Company, to deliver it. He has accepted the invitation, and the lecture will be given in the institution building, Storey's Gate, St. James's Park, London, S.W.1, on Friday, December 2. The title chosen by Mr. Cook is "Sir Charles Parsons and Marine Propulsion."

The Last Nasmyth Wilson Locomotives.—Two 2-6-4 metre-gauge side tank locomotives have recently been completed by Nasmyth Wilson & Co. Ltd. at Patricroft, Manchester, for the South Indian Railway. One has already been shipped; the other is leaving Manchester this week. We understand these locomotives will be the last to be built at the works of Nasmyth Wilson & Co. They have been constructed to the inspection of Messrs. Robert White & Partners and each weighs in working order approximately 47½ tons. The cylinders, arranged outside the frames, are 14 in. dia. by 20 in. stroke; the boiler pressure is 180 lb. per sq. in., and coupled wheels 4 ft. dia. The engines are of a new design for the South Indian Railway and are for branch line duties.

The Buenos Aires Lacroze Tramways.—The Buenos Aires Lacroze Tramways Company is discontinuing the publication of weekly traffic returns, as its system was being operated as from June 11 for account of the new Corporation de Transportes de la Ciudad de Buenos Aires pending definitive transfer in accordance with the Transport Law.

Manchester Road Transport.—The inaugural meeting of the newly-established Road Transport Section of the Manchester Chamber of Commerce was held on July 28, and Major G. A. Renwick was elected as the first Chairman. Major Renwick is Chairman of Fisher Renwick Manchester-London Steamers Limited, and of the Manchester Dry Dock Company, and is also a Director of Scammell Lorries Limited.

Sparse Traffic on Kaunas-Warsaw Line.—A Reuters message dated July 29 from Riga, states that passenger traffic on the railway between Lithuania and Poland is still very light. After a month's working the trains and aeroplanes between Kaunas and Warsaw carry few passengers—usually not more than half a dozen in the trains—and, so far this month, only six people have crossed the frontier by air. Difficulties in the way of getting visas in both countries for visits to either are blamed for this state of affairs.

London & Birmingham Railway Centenary.—Plans are now well advanced for commemorating the centenary in September of the opening throughout of the London & Birmingham Railway. As one of the features of these celebrations, it has been decided to hold at Euston station a centenary exhibition, comprising a demonstration of old and new locomotives and rolling-stock, and an indoor exhibition of models and London & Birmingham Railway relics such as documents and early prints. The indoor exhibition will be held in the shareholders' meeting room. The exhibition will be open to the public from Monday, September 19, until Sunday, September 25, inclusive.

George Stephenson Chancel Fund.—A national appeal is being made for funds to build a chancel over the tomb of George Stephenson in Holy Trinity Church, Chesterfield, where he used to worship. At his death it was a comparatively new church, only 10 years old, and the uncompleted chancel in which he was buried has never been completed. His tomb is ill marked and hidden under the altar. Donations should be forwarded to the Rector, the Rev. E. W. Platt, M.A., B.D., Holy Trinity Rectory, Chesterfield, or to Mr. W. R. Parsonage, B.Sc., Honorary Secretary, Stephenson Chancel Committee, Chesterfield Technical College, Infirmary Road, Chesterfield. Parchment lists of subscribers will be bound and preserved in the chancel.

Serious Slump in South African Receipts.—During the last few months the financial position of the Union has completely changed. Only in February Mr. Pirow, Minister of Railways, anticipated a surplus of £1,000,000 on March 31, whereas the actual surplus was only £23,000. According to a Reuters message, further losses amounting to £412,000 are announced by Mr. Pirow for the first three months of the current financial year. An economy budget is foreshadowed.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the month of June, 1938, amounted to $10,145,000, a decrease of $1,274,000 in comparison with June, 1937. Working expenses were $9,634,000, or $590,000 lower, leaving net earnings $684,000 lower at $511,000. The aggregate gross earnings for the half-year were $61,288,000, a decrease of $5,502,000, and the net earnings for the same period of $2,681,000 showed a fall of $5,579,000.

Canadian National Earnings.—The June, 1938, gross earnings of the Canadian National Railways were $13,702,244, a decrease of $2,389,657 compared with June, 1937. Operating expenses amounted to $14,472,827, with a decrease of $1,183,887, resulting in a deficit of $770,583, against net earnings of $483,188 in the previous period. Aggregate gross earnings for the first half-year of 1938 amounted to $82,759,559, a decrease of $12,236,755, and there was a deficit for the six months of $5,679,983, as compared with aggregate net earnings of $6,667,948 in 1937.

International Rail Congress, Düsseldorf, September, 1938.—At the invitation of the Iron and Steel Institute and representing Mr. R. J. M. Inglis, Engineer (Southern Area), L.N.E.R., Mr. Cecil J. Allen is to read a paper at the fourth triennial conference of the International Rail Congress to be held in Düsseldorf in September. The subject of Mr. Allen's paper is "The Work-Hardening Qualities of Early Steel Rails and their Reproduction in Modern Manufacturing Conditions." Mr. Allen will be the only British participant in the congress to read a paper. Representatives from Germany and Austria, Switzerland, Roumania, Italy, Hungary, France, and the U.S.A. will participate in the proceedings.

"Cornwall—The Western Land."—On Thursday, July 28, at the Royal Hotel, Paddington, a preview was given of "Cornwall—The Western Land," a 16-mm. film, available either as a sound or as a silent reel, made for the Great Western Railway by the Strand Film Co. Ltd. Based on "The Duchy of Cornwall," a preview of which was described in the March 11 issue of THE RAILWAY GAZETTE, "Cornwall—The Western Land" represents an endea-

vour to portray Cornish life and history in a film, free from any suggestion of undue railway publicity. Major J. M. Dewar, Publicity Officer of the Great Western Railway, said that in the film the railway was implied but not blatantly advertised. In the space of about fifteen minutes, the time that the film takes to show, are portrayed most of the phases of Cornish life and industry, ranging from tin mining and sea fishery to the comparatively modern, but increasingly important, industry of catering for the holiday-maker.

Insurance of Livestock Conveyed by Passenger Train Services.—The experimental scheme for the insurance of livestock conveyed by passenger train or other similar service and/or railway-owned vehicles used for the transport of passenger-rated livestock, introduced in July, 1935, has been renewed by the railway companies of Great Britain for a further twelve months from August 1, 1938. Under this scheme the senders of livestock may insure their animals against death or injury during transit by the prepayment of small premiums. The scheme also does not apply to through-booked livestock to Ireland, the Channel Islands, Isle of Wight, and all places overseas, nor to livestock from the Western Isles of Scotland, Orkney and Shetland Islands, Isle of Wight, and all places overseas passing on its initial journey from a port on the mainland.

Train Wreck in Jamaica.—The most serious accident that has ever occurred on the Jamaica Government Railways took place on July 30, when a train from Kingston to Montego Bay became derailed near Balaclava. Accounts to hand indicate that the train, which was being assisted by a pusher engine in rear, ran into a fall of rock in a cutting, and the driver of the pusher, unaware of the impact, did not shut off steam until much telescoping of the train had occurred, with the loss as now officially stated of 30 killed and 75 injured. The Jamaican Director of Railways has appointed a commission of inquiry into the accident.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 30th Week			Totals to Date		
	1938	1937	Inc. or Dec.	1938	1937	Inc. or Dec.
L.M.S.R. (6,834¾ mls.)	£	£	£	£	£	£
Passenger-train traffic...	1,108,000	1,115,000	– 7,000	15,405,000	15,370,000	+ 35,000
Merchandise, &c. ...	383,000	471,000	– 88,000	13,783,000	14,713,000	– 930,000
Coal and coke ...	210,000	223,000	– 13,000	7,582,000	7,752,000	– 170,000
Goods-train traffic ...	593,000	694,000	– 101,000	21,365,000	22,465,000	– 1,100,000
Total receipts	1,701,000	1,809,000	– 108,000	36,770,000	37,835,000	– 1,065,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic...	638,000	654,000	– 16,000	9,864,000	9,983,000	– 119,000
Merchandise, &c. ...	285,000	334,000	– 49,000	9,585,000	10,158,000	– 573,000
Coal and coke ...	199,000	217,000	– 18,000	7,177,000	7,421,000	– 244,000
Goods-train traffic ...	484,000	551,000	– 67,000	16,762,000	17,579,000	– 817,000
Total receipts	1,122,000	1,205,000	– 83,000	26,626,000	27,562,000	– 936,000
G.W.R. (3,737 mls.)						
Passenger-train traffic...	482,000	478,000	+ 4,000	6,393,000	6,439,000	– 46,000
Merchandise, &c. ...	174,000	216,000	– 42,000	5,622,000	5,947,000	– 325,000
Coal and coke ...	96,000	109,000	– 13,000	3,282,000	3,383,000	– 101,000
Goods-train traffic ...	270,000	325,000	– 55,000	8,904,000	9,330,000	– 426,000
Total receipts	752,000	803,000	– 51,000	15,297,000	15,769,000	– 472,000
S.R. (2,148 mls.)						
Passenger-train traffic...	600,000	595,000	+ 5,000	9,621,000	9,657,000	– 36,000
Merchandise, &c. ...	63,500	67,500	– 4,000	1,811,500	1,874,000	– 62,500
Coal and coke ...	31,500	29,500	+ 2,000	911,500	933,000	– 21,500
Goods-train traffic ...	95,000	97,000	– 2,000	2,723,000	2,807,000	– 84,000
Total receipts	695,000	692,000	+ 3,000	12,344,000	12,464,000	– 120,000
Liverpool Overhead ... (6½ mls.)	1,501	1,395	+ 106	40,891	38,354	+ 2,537
Mersey (4½ mls.) ...	4,566	4,202	+ 364	130,202	125,122	+ 5,080
*London Passenger Transport Board ...	567,000	552,100	+ 14,900	2,855,300	2,820,600	+ 34,700
IRELAND						
Belfast & C.D. pass. (80 mls.)	4,913	4,794	+ 119	72,443	75,625	– 3,182
,, ,, goods	423	470	– 47	12,799	14,852	– 2,053
,, ,, total	5,336	5,264	+ 72	85,242	90,477	– 5,235
Great Northern pass. (543 mls.)	16,000	19,950	– 3,950	303,850	309,350	– 5,500
,, ,, goods	9,900	10,050	– 150	263,950	284,550	– 20,600
,, ,, total	25,900	30,000	– 4,100	567,800	593,900	– 26,100
Great Southern pass. (2,076 mls.)	52,161	55,980	– 3,819	1,017,880	1,014,118	+ 3,762
,, ,, goods	39,099	35,261	+ 3,838	1,166,683	1,225,054	– 58,371
,, ,, total	91,260	91,241	+ 19	2,184,563	2,239,172	– 54,609

* 5th Week (before pooling)

British and Irish Railway Stocks and Shares

Stocks	Highest 1937	Lowest 1937	Prices Aug. 3, 1938	Prices Rise/Fall
G.W.R.				
Cons. Ord. ...	67⅜	55¼	39	–1
5% Con. Prefce. ...	127	108	102½	–2
5% Red. Pref. (1950)	113	109	106½	–2
4% Deb.	113⅝	102½	107	–½
4½% Deb.... ...	118	106	109½	—
4½% Deb.	124½	112	114½	—
5% Deb.	136½	122¾	128½	—
2½% Deb.... ...	76	64	66½	—
5% Rt. Charge ...	133 7/16	118	124½	–2
5% Cons. Guar. ...	133¼	116½	121½	–4
L.M.S.R.				
Ord.	36⅛	25⅜	14½	+¾
4% Prefce. (1923)	82½	65¼	34½	—
4% Prefce. ...	92½	77¾	61½	+3
5% Red. Pref. (1955)	107¾	102	80½	+3
4% Deb.	108	99¼	100½	+½
5% Red. Deb. (1952)	117½	111	112½	—
4% Guar. ...	104	95⅞	93½	+2
L.N.E.R.				
5% Pref. Ord. ...	12½	6¾	4¼	—
Def. Ord.	6¼	3⅝	2½	+⅛
4% First Prefce.	79½	63	32½	—
4% Second Prefce.	31½	21	11	—
5% Red. Pref. (1955)	101¼	89¾	57½	+4
4% First Guar. ...	103	91⅞	82½	+2
4% Second Guar.	97⅝	85½	69½	+1
3% Deb.	84⅛	74	73½	—
4% Deb.	107¼	98½	99	—
5% Red. Deb. (1947)	113½	106½	109½	—
4½% Sinking Fund Red. Deb.	110 5/16	105½	107	—
SOUTHERN				
Pref. Ord.... ...	98⅝	83½	60½	+1
Def. Ord.	27⅞	16¾	14½	+¾
5% Pref.	126 1/16	105 13/16	101½	—
5% Red. Pref. (1964)	118	110¼	112	—
5% Guar. Prefce.	133¾	116¾	123½	–2
5% Red. Guar. Pref. (1957)	118½	111½	115	—
4% Deb.	112	101¼	105½	—
5% Deb.	135¾	123½	126½	—
4% Red. Deb. 1962–67	113	105	106½	—
BELFAST & C.D.				
Ord.	5	4	4	—
FORTH BRIDGE				
4% Deb.	106	99½	100½	—
4% Guar. ...	105¾	99	99½	—
G. NORTHERN (IRELAND)				
Ord.	11	5	3½	—
G. SOUTHERN (IRELAND)				
Ord.	50	21½	20	—
Prefce.	61	34	14	–½
Guar.	94¾	69½	42	–6
Deb.	95	82⅛	70	–½
L.P.T.B.				
4½% "A" ...	123¾	110½	118½	—
5% "A" ...	135	121½	128½	—
4½% "T.F.A." ...	108¾	104	106	—
5% "B" ...	125	114½	119½	—
"C"	99¾	75	74	—
MERSEY				
Ord.	42⅜	22	17	–1
4% Perp. Deb. ...	103	96¾	99*	—
3% Perp. Deb. ...	77⅝	74½	73½*	—
3% Perp. Prefce.	68¾	61¼	65	—

* ex dividend

RAILWAY AND OTHER REPORTS

Great Western Railway Company.—The gross receipts from railway and ancillary businesses for the half-year ended June 30 were £306,000 less than in the corresponding period of last year. Expenditure on railway and ancillary businesses increased by £522,000. The net revenue from all sources decreased by £818,000. The total decrease in railway receipts was £283,000—passenger train receipts showing a decrease of £25,000, goods train receipts a decrease of £250,000, and miscellaneous receipts a decrease of £8,000. The directors have decided in the circumstances not to make any interim dividend payment on the consolidated ordinary stock for the half-year. Warrants for the half-year's dividend on the consolidated guaranteed, consolidated preference, and redeemable preference stocks will be posted on August 17.

Fishguard & Rosslare Railways & Harbours Company.—The net revenue for the half-year to June 30 was £39,561, this being the amount provided under the guarantee of the Great Western and Great Southern (Eire) Railway Companies, after accounting for fees and expenses. Debenture interest takes £13,904, the dividend on the new guaranteed 3½ per cent. preference £21,659, and dividend on new 3½ per cent. preference 1914, £3,867.

Great Northern Railway (Ireland).—The directors announce that in consequence of the increase in cost of labour and materials and the decline in traffic receipts, it has been decided to defer payment of an interim dividend on the guaranteed stock. The position is to be reviewed again at the end of the year. A year ago an interim of 2 per cent. was paid on the £869,270 of 4 per cent. guaranteed stock, after making a transfer from reserves.

Beira and Rhodesia Railways.—Gross earnings on the Rhodesia Railway system comprising Rhodesia Railways Limited, the Beira Railway, and the Shabani Railway, amounted for the six months to the end of last March, to £3,097,000, an increase of £510,000 over the corresponding period of 1936-37. As expenditure rose by £192,000 to £1,643,300, the operating revenue was £1,453,700, an increase of nearly £318,500 over the corresponding period. Net receipts for March, however, showed a fall of nearly £30,000 owing principally to higher operating costs.

Brazil Railway Company.—The report for 1937 states that the income of the various bond issues received in 1936 is only sufficient to enable the joint committee to distribute ½ per cent. (same as in 1935) on the International Bonds, 25 French francs per note on the 6½ per cent. Notes (against 15 fr.), and fr. 22·50 per bond on the French series bonds (unchanged). The general expenses and taxes have been paid out of gross receipts and debited to the various bond issues, in accordance with the Composition Agreement of July 18, 1917.

Rochdale Canal.—An interim dividend of 1 per cent. is to be paid, the same as a year ago.

Birmingham Canal Navigations.—An interim dividend of 2 per cent., less tax, is being paid, the same as last year.

Dublin United Tramways Co. (1896) Ltd.—The directors propose to pay an interim dividend of 1 per cent., the same as last year. For the whole of 1937 the distribution was 3 per cent.

British Wagon Co. Ltd.—Interim dividends of 5s. a share on the £20 shares (£3 paid), and 1s. 8d. a share on the £20 shares (£1 paid), have been declared. These are the same as last year.

Gloucester Railway Carriage & Wagon Co. Ltd.—The directors report that the improvement on the manufacturing side has been maintained and the wagon-hiring business also shows a slightly more satisfactory return owing to the increase in the hiring rates at which expiring leases have been renewed. The net profit, after making the usual provision for depreciation, shows an increase to £17,861 from £9,201 in 1936-37. Wagon depreciation is to receive £10,000 (against nil) with a balance forward of £3,469 (against £7,026). The dividend is to be raised from 2½ per cent. to 3 per cent. as already announced.

Baldwin Locomotive Works.—For the year ended June 30 the consolidated net income amounted to $64,000 (equal to $1·41 on the 7 per cent. preferred stock) compared with a net loss of $608,000 for the previous year. The latter is not strictly comparable owing to the capital readjustment affecting interest charges.

Laycock Engineering Co. Ltd.—A dividend of 7½ per cent. is recommended for the year ended June 30, against 5 per cent. for 1936-37, payable on September 30. The company was registered on December 19, 1935, and the first dividend paid was 2½ per cent. for the first half of 1936 on a capital of £200,000, increased to £300,000 in December, 1936.

Anglo-Argentine Tramways Company.—Gross receipts for the year 1937 amounted to £2,082,865, compared with £1,903,595 in 1936, but expenditure rose from £2,017,286 to £2,251,679, leaving a debit balance of £168,814 against £113,691. After charging the annuity of £70,660 to the City of Buenos Ayres Tramways Company and debenture interest, including interest on arrear, the deficit for the year is £832,111, against £753,018, making the accumulated debit balance £3,266,467.

Internal Airway Merger

A further step towards the rationalisation of civil aviation in the United Kingdom will be taken by the forthcoming formation of a new air company embracing air transport services of the Great Western and Southern Railway Companies, and the Olley group. The new company, which is in association with Railway Air Services Limited, and Olley Air Service Limited, will take over the services now operated by Railway Air Services Limited on behalf of the railway companies between:—

Manchester—Brighton *via* Liverpool, Birmingham, Bristol, Southampton, Isle of Wight.
Bristol—Cardiff—Plymouth.
Cardiff—Brighton *via* Bristol, Southampton, Isle of Wight.

Also those run by Channel Air Ferries Limited, including services between:—

Heston—Bembridge.
Shoreham—Bembridge—Bournemouth—Bristol—Cardiff.
Plymouth—Land's End—Scilly Islands.

The headquarters of the new company will be at Shoreham for the time being. The inclusion of railway interests in the new air company will permit of tickets being made interavailable between rail, steamer and air services, and also of passengers travelling by air on these routes sending their heavy luggage in advance by rail or steamer.

U.S.A. Expresses in Collision.—A collision occurred at Rocky Ridge, Ohio, on August 2, between the Commodore Vanderbilt (Chicago-New York) and the Mercury (Detroit-Cleveland) expresses of the New York Central System. The Commodore Vanderbilt ran into the rear of the Mercury, the brakes failing to check it fully on account of the slippery rails, but was later able to continue to New York; 38 persons were injured.

The Model Engineer Exhibition.—The 20th annual model engineering exhibition will be held at the Royal Horticultural Hall, Vincent Square, Westminster, from September 15 to 24, and will contain a record show of engineering and ship models of all kinds, lathes and light machine tools, and workshop equipment. The exhibition will be opened by the Earl of Northesk, President of the Society of Model and Experimental Engineers. The Royal Air Force is arranging a special exhibit illustrating its aircraft apprentice training methods, in connection with the present Air Ministry recruiting campaign. In addition to the usual championship cups and other prizes, Admiral Sir Reginald Bacon is this year offering a special cup for the best model made by a lady. The exhibition is organised by Percival Marshall & Co. Ltd., 13-16, Fisher Street, London, W.C.1.

OFFICIAL NOTICES

Buenos Ayres Western Railway Ltd.

ELECTRIFICATION OF SUBURBAN LINES—CHANGE OF FREQUENCY (25 TO 50 PERIODS).

TENDERS are invited for the supply, delivery, f.o.b., supervision of erection and maintenance of Rectifier Equipments for Traction Substations in accordance with the Railway's Specification.

The Specification and Form of Tender may be inspected free of charge and obtained at the offices of Messrs. Merz & McLellan, 32, Victoria Street, Westminster, London, S.W.1, on and after Wednesday, 3rd August, 1938.

Applications for Specifications must be accompanied by a fee of three guineas for three copies and one guinea for each subsequent copy of the Specification. The amount paid for the three copies will be refunded on receipt of a *bona fide* Tender in duplicate.

Sealed Tenders, together with all documents relative thereto, endorsed to indicate the work to which they relate, must be submitted in terms of the Conditions of Tendering at the offices of the Railway Company not later than 11 a.m. on Tuesday, 20th September, 1938.

The lowest or any Tender will not necessarily be accepted.

N. F. E. GREY,
Secretary.

Buenos Ayres Western Railway, Limited,
River Plate House,
Finsbury Circus,
London, E.C.2.

South Indian Railway Company, Limited

THE Directors are prepared to receive Tenders for the supply of :—

1. SOLID DRAWN STEEL BOILER TUBES.
2. STEEL TYRES.

Specifications and Forms of Tender will be available at the Company's Offices, 91, Petty France, Westminster, S.W.1.

Tenders addressed to the Chairman and Directors of the South Indian Railway Company Limited, marked "Tender for Boiler Tubes," or as the case may be, with the name of the firm tendering, must be left with the undersigned not later than 12 Noon on Friday, the 26th August, 1938.

The Directors do not bind themselves to accept the lowest or any Tender.

A charge, which will not be returned, will be made of 10s. for each copy of each Specification.

Copies of the drawing may be obtained at the Offices of the Company's Consulting Engineers, Messrs. Robert White & Partners, 3, Victoria Street, Westminster, S.W.1.

E. A. S. BELL,
Managing Director.

91, Petty France,
Westminster, S.W.1.
3rd August, 1938.

JUNIOR Engineer Draughtsman required for Resident Engineer's Dept. of Railway in Chile. Three years' agreement, which may be extended. Furnished quarters and passage. Age 25 to 30. Write, stating age and full details of education, training and experience, and salary required to: Box "S.J.," c/o 95, Bishopsgate, London, E.C.2.

THE MADRAS & SOUTHERN MAHRATTA RAILWAY COMPANY LIMITED invite Tenders for :—

5,550 STEEL BOILER TUBES,
40 STEEL ARCH TUBES,
AND
50 STEEL FLUE TUBES.

Specification and Form of Tender can be obtained from the Company's Offices, 123, Victoria Street, Westminster, London, S.W.1.

Fee ONE GUINEA, *which will not be returned.*

Tenders must be submitted not later than 2 o'clock p.m. on TUESDAY, 23RD AUGUST, 1938.

The Directors do not bind themselves to accept the lowest or any Tender and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
V. CRASTER,
Secretary.

CONTRACTS AND TENDERS

Andrew Barclay, Sons & Co. Ltd. has received from the War Office a repeat order for a diesel locomotive, which is to be fitted with a 180 b.h.p. Paxman-Ricardo engine, a Vulcan-Sinclair fluid coupling, and a Wilson gearbox.

Machine Tools for India

The Bombay, Baroda & Central India Railway Administration has placed the following orders for machine tools to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton :—

Morrisson, Marshall & Hill : One 10½-in. belt-driven centre lathe and one electrically-driven 7-in. centre lathe.

Ormerod Shapers Limited : One 26-in. stroke belt-driven shaping machine.

Kendall & Gent (1920) Limited : One belt-driven single-head bolt and tube screwing machine.

Atlas Engineering Company : One belt-driven 3-ft. 7-in. radius radial drilling machine.

The Crown Agents for the Colonies have recently placed the following orders :—

Wolverhampton Corrugated Iron Co. Ltd. : Galvanised steel.

Stewarts and Lloyds Limited : Galvanised wrought-iron piping.

Staveley Coal & Iron Co. Ltd. : Hydraulic pipes.

J. Woodhead & Sons Limited : Laminated springs.

Albion Motors Limited : Lorry chassis and lorries.

The Phosphor Bronze Co. Ltd. : Phosphor bronze metal.

Ferguson, Pailin Limited : Power station switchgear.

Steel Co. of Scotland Ltd. : Rails.

Sandacre Screw Co. Ltd. : Roof stay nuts.

Whitehead Iron & Steel Co. Ltd. : Round mild steel.

Dean, Smith & Grace Limited : Screw cutting lathe.

Wright's Forge & Engineering Co. Ltd. : Steelwork for goods shed.

Allen West & Co. Ltd. : Switchgear.

The Winterbottom Book Cloth Co. Ltd. has received an order from the Egyptian State Railways Administration for tracing cloth (Ref. No. ESR.355. G.3./9).

The Britannia Engineering Co. Ltd. has received an order from the North Western Railway, India, for 200 9-ft drawbars.

Locomotives for Indo-China

The Soc. Alsacienne de Constructions Mécaniques has received an order from the French Colonial Ministry for 15 metre-gauge two-cylinder simple Pacific locomotives with double-bogie tenders for use on the Trans Indo-China main line. They are to be equipped with A.C.F.I. feed-water heaters and Henricot automatic couplers.

Lindley & Company has received an order from the South Indian Railway Administration to the inspection of Messrs. Robert White & Partners, for 23 copper tube and back plates.

The Associated Locomotive Equipment Co. Ltd. has received an order from the Bengal-Nagpur Railway Administration for a quantity of cylinders and spare parts for locomotives.

United States Railways Curtail Rolling Stock Purchases

According to a Reuters message, some 6,260 new freight cars were placed in service on the Class 1 American railways during the first half of the year, compared with 34,187 for the same period last year, and 11,604 for the first half of 1936. In the same period, 132 new steam locomotives were put into service, compared with 166 in 1937 and 18 in 1936. New electric and diesel locomotives, however, totalled 72 for the six-month period, compared with 20 for the same period last year and 11 in 1936. The railways had on order on July 1 only 5,021 new freight cars, compared with 42,624 last year, 37 steam locomotives, compared with 301, and 26 electric and diesel locomotives, compared with 33.

A. C. Bottomley & Company has received an order from the North Western Railway, India, for 400 pressed-steel drawbar cradles.

Heatly & Gresham Limited has received an order for the construction in Great Britain of one superheated locomotive boiler required for I.R.S. Class XA and XA1 engines, North Western Railway, India (Total price Rs. 31,316 plus Rs. 549 for two sets hand made tracings).

Krupp Eisenhandel G.m.b.H. has received an order from the Egyptian State Railways Administration for mild steel angles (Ref. No. ESR. 1.439, total cost £220, delivery free, Gabbary Quay).

Tenders are invited by the Egyptian State Railways Administration, receivable by the Superintendent of Stores, Cairo, by August 24, for the supply of 58,350 kg. mild steel plates.

Tenders are invited by the Egyptian State Railways Administration, receivable at the General Management, Cairo station, by August 30, for the supply of 205,300 kg. round mild steel.

Tenders are invited by the Egyptian State Railways Administration, receivable at the General Management, Cairo station, by August 16, for the supply of about 18,900 solid-drawn steel-boiler and superheater flue tubes required during one year.

Tenders are invited by the Chief Controller of Stores, Indian Stores Department (Hardware Section), Simla, receivable by August 22, for the supply of quantities of permanent-way bolts, nuts, and spikes required for the E.B., G.I.P., and N.W. Railways during the period December 16, 1938, to December 15, 1939.

Railway Share Market

Partly owing to international political developments the stock and share markets have been moderately reactionary this week, and holiday influences continued to prevent improvement in the volume of business. Home railway stocks were affected by general market conditions and failed to hold the better tendency which developed towards the end of last week. The L.M.S.R. half-yearly statement, which has aroused hopes that there are reasonable possibilities of the 4 per cent. preference stock receiving its full dividend this year, assisted sentiment, but the past week's traffics, which again show declines in goods receipts, tended to increase fears that there is little prospect of improved gross revenue for the main line railways during the current half year unless a substantial improvement is shown in general trade conditions. On the other hand, it would seem not unlikely that expenses will be rather lower than in the first six months of the year. In the case of the Southern the past week's traffic return shows an increase of £3,000, but the other lines again have to report a large fall in receipts. It is realised that the movement of goods has been curtailed owing to holiday influences and that during the next few weeks passenger traffics should be at a better level.

L.M.S.R. ordinary has been a firmer market at around 14⅜, while the 4 per cent. preference improved to 61½ under the influence of the half-yearly statement, but the 1923 preference, which touched 36½ at one time, has since gone back to 35½. The 4 per cent. guaranteed stock improved to 94½. Southern deferred transferred around 14½ and the preferred around 60. On the basis of the half-yearly figures it is doubtful if earnings on the preferred stock are running at a higher rate than 2½ per cent., but this has to be considered in relation to the fact that the Southern usually has its best period in the second half of the year. The 5 per cent. preference stock was fractionally lower at 101, at which the yield would appear to be not unattractive. Similar remarks apply in the case of Great Western 5 per cent. preference, which has made the slightly reduced price of 103. The ordinary stock of the last-named railway has moved down to 39½, the absence of an interim dividend having led to doubts whether the directors are prepared to draw on reserves in order to pay 3 per cent. for the current year. L.N.E.R. first guaranteed stock has improved to 83, but the second guaranteed, after touching 71, receded to 70. The first and second preference were out of favour at 32 and 11 respectively. London Transport "C" was fairly steady at 74½.

In the foreign railway market Argentine Railway securities were again reactionary owing to absence of demand. Cordoba Central first debentures have gone back to 50. Elsewhere, Antofagasta was higher at 13½; the market is hopeful that before long there may be another payment in respect of preference dividend arrears. American Railway stocks were less buoyant owing to the trend of Wall Street. Canadian Pacific continued to fluctuate around $7.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1937-38	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1937	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1937	Prices: Lowest 1937	Prices: Aug. 3, 1938	Yield % (See Note)
				£	£		£	£	£					
South & Central America	Antofagasta (Chili) & Bolivia	834	31.7.38	11,160	— 8,720	31	473,410	504,120	— 30,710	Ord. Stk.	29	10¼	13	Nil
	Argentine North Eastern	753	30.7.38	11,439	+ 781	5	49,882	45,695	+ 4,187	,,	18¼	6	6	Nil
	Argentine Transandine	—	—	—	—	—	—	—	—	A. Deb.	93½	60	80	5
	Bolivar	174	June, 1938	3,550	— 2,150	26	22,600	35,000	— 12,400	6 p.c. Deb.	9½	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	17	9	6	85/16
	Buenos Ayres & Pacific	2,806	30.7.38	74,566	— 7,134	5	314,827	365,199	— 50,372	Ord. Stk.	17⅛	5½	5	Nil
	Buenos Ayres Central	190	16.7.38	$113,000	— $43,500	3	£294,700	£375,800	— $82,100	Mt. Deb.	41½	18	14	Nil
	Buenos Ayres Gt. Southern	5,084	30.7.38	131,762	+ 2,358	5	540,447	537,655	+ 2,792	Ord. Stk.	3 6/4	13½	12½	Nil
	Buenos Ayres Western	1,930	30.7.38	39,640	— 7,693	5	166,500	201,551	— 35,051	,,	3 5/4	11¼	8½	Nil
	Central Argentine	3,700	30.7.38	101,573	— 41,907	5	446,778	669,810	— 223,032	,,	34¼	10¾	8½	Nil
	Do.	—	—	—	—	—	—	—	—	Did.	20½	4½	4½	Nil
	Cent. Uruguay of M. Video	972	23.7.38	17,804	+ 1,936	4	56,849	53,143	+ 3,706	Ord. Stk.	67/32	2	2	Nil
	Cordoba Central	1,218	—	—	—	—	—	—	—	Ord. Inc.	6¼	1½	3	Nil
	Costa Rica	188	May, 1938	22,104	— 3,850	48	283,030	218,282	+ 64,748	Stk.	38	27	25½§	7 13/16
	Dorada	70	June, 1938	16,500	+ 2,500	26	95,700	90,400	+ 5,300	1 Mt. Db.	107	106	105	5 11/16
	Entre Rios	810	30.7.38	15,490	+ 1,489	5	66,438	62,599	+ 3,839	Ord. Stk.	1 7/16	6	6	Nil
	Great Western of Brazil	1,092	30.7.38	4,700	— 1,600	31	201,700	224,600	— 22,900	Ord. Sh.	5/4	1/8	1/4	Nil
	International of Cl. Amer.	794	June, 1938	$425,611	+ $9,637	26	$3,010,489	$3,126,388	— $115,899	—	—	—	—	—
	Interoceanic of Mexico	—	—	—	—	—	—	—	—	1st Pref.	2/	1/-	1/2	Nil
	La Guaira & Caracas	22¾	July, 1938	5,345	+ 930	31	35,580	38,120	— 2,540	Stk.	8½	6	8½	Nil
	Leopoldina	1,918	30.7.38	24,226	— 1,548	31	569,827	£84,513	— 114,686	Ord. Stk.	9¼	3	2	Nil
	Mexican	483	21.7.38	$255,400	— $30,300	3	$818,700	$830,300	— $11,600	,,	1½	1/4	5/16	Nil
	Midland of Uruguay	319	June, 1938	7,400	— 2,097	52	111,899	105,718	+ 6,181	,,	1⅞	1/2	1/2	Nil
	Nitrate	386	31.7.38	5,209	— 404	51	90,505	95,366	— 4,361	Ord. Sh.	31/16	2	2	5
	Paraguay Central	274	23.7.38	$3,846,006	+ $453,000	4	$11,438,000	$13,288,000	— $1,850,000	Pr. Li. Stk.	81	79¼	62½	95/8
	Peruvian Corporation	1,059	June, 1938	66,731	— 12,548	52	835,013	870,203	— 35,190	Pref.	14¾	4½	3¼	Nil
	Salvador	100	23.7.38	£10,372	— £1,128	4	£33,189	£41,982	— £8,793	Pr. Li. Db	23½	21½	22½	Nil
	San Paulo	153½	24.7.38	29,702	— 4,892	30	927,700	963,189	— 33,489	Ord. Stk.	98½	56	40	10
	Taltal	160	June, 1938	2,295	— 820	52	39,100	41,035	— 1,935	Ord. Sh.	17/16	11/16	5/4	135/16
	United of Havana	1,353	30.7.38	16,251	— 5,342	5	67,329	83,976	— 16,647	Ord. Stk.	56/8	31/32	1½	Nil
	Uruguay Northern	73	June, 1938	909	+ 76	52	11,259	11,689	— 430	Deb. Stk.	10	2	2	Nil
Canada	Canadian National	23,781	21.7.38	659,241	— 81,635	29	18,440,669	21,195,712	— 2,755,043	—	—	—	—	—
	Canadian Northern	—	—	—	—	—	—	—	— 4 p.c.	Perp. Dbs.	77	62½	63½	65/16
	Grand Trunk	—	—	—	—	—	—	—		4 p.c. Gar.	101⅞	94½	102½	3⅞
	Canadian Pacific	17,186	21.7.38	503,800	— 33,800	29	13,725,600	14,958,000	— 1,232,400	Ord. Stk.	18	7¼	7	Nil
India†	Assam Bengal	1,329	10.7.38	35,962	+ 1,348	14	377,186	359,594	+ 17,592	Ord. Stk.	86	73½	78	31/16
	Barsi Light	202	10.7.38	14,400*	+ 11,648	14	49,140	32,677	+ 16,463	Ord. Sh.	66½	46	60	85/16
	Bengal & North Western	2,116	10.7.38	72,110	— 5,797	14	859,821	902,497	— 42,676	Ord. Stk.	317	301	289½	6¼
	Bengal Dooars & Extension	161	10.7.38	3,153	— 958	14	35,247	34,888	+ 359	,,	100	84	83½	7
	Bengal-Nagpur	3,268	10.7.38	164,175	— 29,705	14	2,029,742	2,046,964	— 17,222	,,	101	89	92	4⅝
	Bombay, Baroda & Cl. India	3,085	20.7.38	192,750	— 150	16	2,813,400	2,846,525	— 73,125	,,	113	110½	110½	57/16
	Madras & Southern Mahratta	2,967	10.7.38	149,925	+ 10,873	14	1,662,798	1,578,799	+ 83,999	,,	110	105	107	8 7/16
	Rohilkund & Kumaon	546	10.7.38	13,603	— 1,164	14	176,079	180,281	— 4,202	,,	314	302	297½	6 1/16
	South Indian	2,331½	10.7.38	111,113	— 963	14	1,187,235	1,179,641	+ 7,594	,,	103½	99½	101½	4 13/16
Various	Beira-Umtali	204	May, 1938	84,595	+ 434	35	693,281	585,391	+ 107,890	—	—	—	—	—
	Egyptian Delta	620	10.7.38	5,516	— 978	14	54,916	58,265	— 3,349	Pf. Sh.	31/-	5/4	5/4	Nil
	Kenya & Uganda	1,625	June, 1938	216,938	+ 28,675	26	1,498,289	1,524,339	— 26,050	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb	48⅛	43½	43	8⅛
	Midland of W. Australia	277	May, 1938	16,569	+ 4,979	48	164,158	144,240	+ 19,918	Inc. Deb.	98	93½	93½	4¼
	Nigerian	1,900	11.6.38	32,644	— 18,097	11	319,824	630,187	— 310,363	—	—	—	—	—
	Rhodesia	2,442	May, 1938	411,404	— 285	35	3,317,856	2,932,177	+ 385,679	—	—	—	—	—
	South Africa	13,263	9.7.38	651,871	— 6,548	15	8,738,874	8,945,267	— 206,393	—	—	—	—	—
	Victoria	4,774	Apr., 1938	871,575	— 13,515	44	8,166,485	8,519,336	— 352,851	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16

* Ashadi fair. † Receipts are calculated @ 1s. 6d. to the rupee § ex dividend.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value

Diesel Railway Traction

The Argentine Locomotives

THE 64 metre-gauge diesel shunting and local freight locomotives for which the Argentine State Railways are inquiring (see THE RAILWAY GAZETTE for May 13 last), are to be of two types. The first is to have a maximum tractive effort of at least 5,000 kg. (11,200 lb.) and on the continuous rating the tractive effort at the drawbar must be at least 4,000 kg. (8,800 lb.) at 4½ m.p.h. The top speed is to be 35 km.p.h. (22 m.p.h.) and the locomotive must be able to negotiate 75 m. (245 ft.) curves. In this first category the locomotives offered may be either of the six-wheeled type with a maximum axle-load of 9 *tonnes*, or of the double-bogie type with an axle-load of 7 to 9 *tonnes*, and although a preference for electric transmission is expressed, alternatives with other forms will be considered. The second type of unit required is really a loco-tractor, and is to have a weight of 14 to 16 *tonnes* spread over its two axles, a starting tractive effort at the drawbar of at least 2,500 kg. (5,500 lb.) and a continuous drawbar pull of 2,000 kg. (4,400 lb.) at 4½ m.p.h. In both types it is considered essential that the engine should normally work well within its maximum power, and in the larger size it is stipulated that the engine must develop continuously on the test bench at least 25 b.h.p. more than the output necessary to maintain the specified continuous tractive effort. In the smaller size the allowance is 12 b.h.p. The locomotives are to be suitable for reliable operation in ambient temperatures of 45° C. with a very humid atmosphere, and they must have fuel tanks of a capacity sufficient for 24 hours of continuous work. The fuel to be used will come from the wells owned by the Argentine State at Comodoro Rivadavia and Salta, and in the first case will have a specific gravity of 0·86 to 0·875 at 15° C., and in the second brand 0·84 at 15° C. The viscosity S.U. is 45 sec. minimum and 90 sec. max. at 38° C., the flash point is over 50° C., and the maximum sulphur content is 0·2 per cent. The calorific value is at least 10,700 cal.

Auxiliary Power Lines

ONE of the problems connected with the design and operation of diesel set trains of great length and power is the transmission of the current for the lighting and other auxiliaries down the train, and this is intensified if the train is air-conditioned or has other modern refinements either for passenger comfort or for improved operation. As it is not unlikely that longer diesel trains of *de luxe* or ultra-modern characteristics may be introduced in Europe, it is instructive to consider the largest and most powerful diesel trains in the world, the Union Pacific Railroad's 17-car 5,400 b.h.p. sets. On the first Union Pacific streamliner—a three-car 600 b.h.p. unit—the voltage of the train auxiliary circuits was 64 d.c., compared with 32 volts on the conventional steam train, but as more and longer diesel streamliners were built it was found necessary to increase the voltage to 220 and to use three-phase current in order to keep down the size of the transmission cables. Even with this voltage the size of the copper cables required to transmit the current through the 17-car trains is considerable, and studies are being made of the use of 440 or 550 volts three-phase. Motors of this voltage can be obtained and small transformers can be used to step the voltage down to a value suitable for lighting. The 17-car trains have an extremely large auxiliary load, including air-conditioning, a heating load amounting to over 20 kW. in some cars, and a heavy lighting load, with a maximum of over 7 kW. in one car. There are four three-phase train lines, and the total connected cooling and lighting loads (heating load instead of cooling in the winter) approximates to 300 kW. in summer. The two train lines taking cooling and heating requirements consist of two 350,000 c.m. cables in parallel for each conductor of each three-phase line; the two train lines for lighting and miscellaneous power consist of No. 3/0 cables, the total transmission system comprising twelve 350,000 c.m. and six No. 3/0 cables throughout the train. This large amount of copper is necessary in order to keep the voltage drop to a reasonable figure over a distance of about 1,300 ft. The total voltage drop in each train line for the air-conditioning load is 2 to 2½ per cent. and for the lighting load about 3 per cent. The inter-car jumpers on these trains are of a positively latched automatic pull-out type at a coupled car connection, and of a bolted terminal type where the cars are articulated. A control wire is run with all power jumpers, and its disconnection or breaking trips the main train line circuit before arcing can occur at the parted jumper. One difficulty encountered with these American trains is the large receptacles and plugs of the jumpers. On some of the trains with 220-volt three-phase lines there are six or seven of these receptacles between the vehicles, which makes the uncoupling of the cars a tedious business. Consideration is now being given to a single transmission line down the train which would operate at 2,300 volts three-phase 60 cycles; transformers would be used for stepping the current down to the motor and lighting voltages. In such a system the plugs and receptacles would be much smaller than at the lower voltages, but the matter of providing safe insulation and adequate clearances presents some problems.

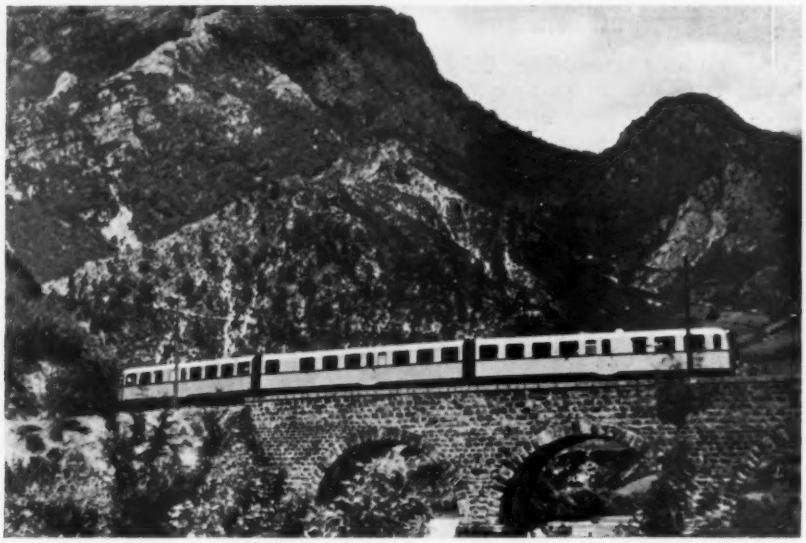
More Diesels for Egypt

SPEAKING at the recent annual meeting of the Egyptian Delta Light Railways, the Chairman, Sir Montagu Sharpe, said that in view of the recent development of the diesel engine, experiments had been carried out during the past year with a diesel tractor and coach. These trials had proved entirely satisfactory, and the construction of 20 diesel units had been authorised, and it was hoped they would be in service by the end of 1938. The fuel and oil consumption of these diesel tractors was substantially less than that of the Sentinel tractors and it was expected that when these units were put into service a considerable saving in working expenses would be effected. The programme the directors had in view included the purchase of at least double this number of diesel tractors.

The other advantages of the diesel unit over the Sentinel tractor were that the cost of maintenance was expected to be lower, and that the diesel unit could start and stop quicker, which enabled a considerable amount of time to be saved over the longer journeys. It was possible that in the near future they might be faced with competition from diesel-engined road vehicles. To meet this the line must be similarly equipped, and it was believed that the diesel tractors would enable them to retain and even increase the traffic.

Express Narrow-Gauge Diesel-Mechanical Trains in Jugoslavia

30 per cent. cut in running time over difficult 400-mile line



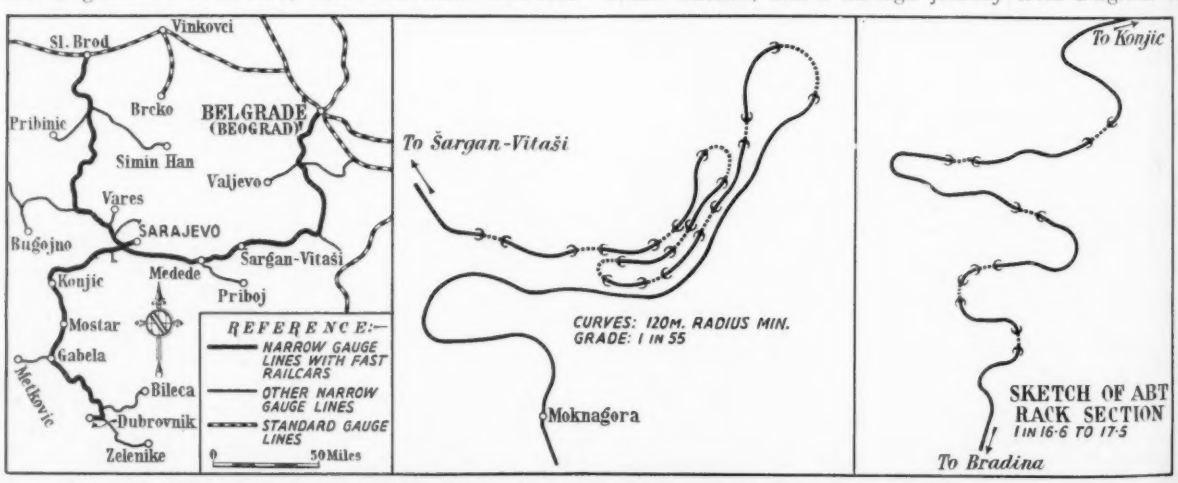
480 b.h.p. three-car diesel train on the Belgrade-Adriatic line

THE possibilities of railcar traction in speeding up passenger traffic on narrow-gauge lines, while at the same time considerably reducing the cost of operation, are being demonstrated in striking fashion on the extensive 760 mm. gauge system of the Jugoslav State Railways which serves Bosnia and Herzegovina and connects those areas with Belgrade. A good deal of this system was built originally by the Austrians as a military line, and to have made this portion and the succeeding extensions towards Belgrade of standard gauge would have increased the cost enormously without any prospect of a return on the capital invested, because of the low density of traffic and the very moderate standards of comfort required.

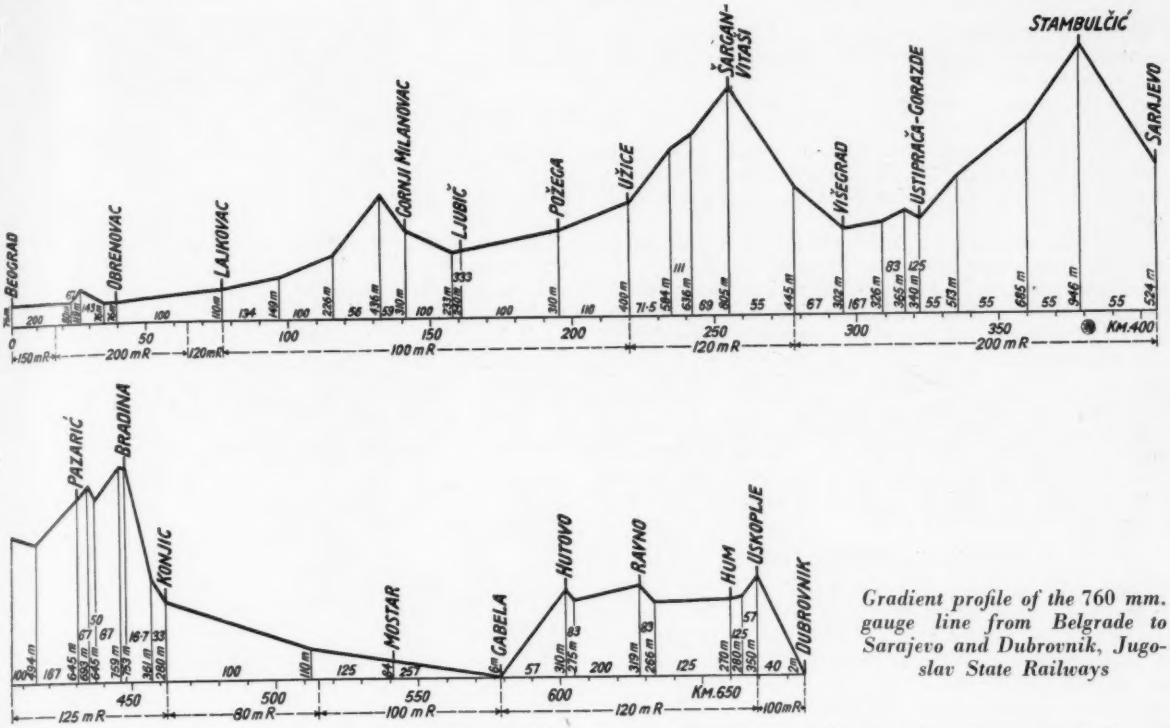
Although, on a length basis, over 60 per cent. of the line has ruling grades of 1 in 100 or flatter, the remainder is extremely steep, culminating in a 6-mile rack section with a grade of 1 in 16·6, and with other non-rack grades of 1 in 40 to 1 in 67, as indicated on the accompanying gradient profile. Moreover, 50 per cent. of the whole 685 km. (425 miles) from Belgrade to Dubrovnik is on curves, and on the other narrow-gauge main line from Slavonski-Brod to Sarajevo 60 per cent. of the route is on curves. On the Belgrade—Dubrovnik line the sharpest curve is 77 m. (253 ft.) radius and there are frequent curves of 80 m. to 100 m. (263 to 328 ft.) radius on grades and through tunnels. Added to this there are 134 tunnels between Belgrade and Sarajevo and 34 between Sarajevo and Dubrovnik, and it was these just as much as the heavy grades which made traffic operation so difficult and the journey so uncomfortable to passengers.

Conditions Limiting the New Service

The gauge and the physical characteristics of the line severely limited the maximum and overall speeds with steam traction, and a through journey from Belgrade to



Map of Belgrade-Dubrovnik and Sarajevo-Brod lines, and sketches of two difficult sections



Gradient profile of the 760 mm. gauge line from Belgrade to Sarajevo and Dubrovnik, Jugoslav State Railways

Dubrovnik took 23 hr., involving a whole night in the train without any proper sleeping accommodation, and with the necessity of keeping the windows shut for nearly the whole journey, however hot the weather. An increase in the tourist traffic to the Adriatic coast and in the number of long distance journeys, led the Jugoslav State Railways to order seven three-car diesel-mechanical trains, and after a ceremonial inauguration on July 17-19, a regular daily service each way was introduced between Belgrade and Dubrovnik on July 20, the time for the down journey being 16 hr. 38 min. inclusive of 11 booked and four conditional stops, and for the up journey 16 hr. 39 min. including 12 booked and three conditional stops. These trains are of the Ganz type; the general design of the trains, the driving bogies, the complete power-transmission equipment, the electro-pneumatic remote control, and the electro-magnetic rail brake were supplied by Ganz from the Budapest works, and the carriage portions, which are of the normal Ganz construction adapted to the narrow gauge, were built at Slavonski Brod by the First Jugoslav Carriage Works, to the requirements of Mr. Zvetkovič, the Chief Mechanical Engineer of the Jugoslav State Railways.

The running time of 16¼ hr. between Belgrade and Dubrovnik means an average speed of 26¼ m.p.h., a meritorious performance considering the difficulties of the line, that the absolute top speed allowed is 60 km.p.h. (37 m.p.h.), and that for a considerable part of the journey curves and track considerations will not permit of speeds in excess of 38 to 42 km.p.h. (23·6 to 26·2 m.p.h.). Then again, on the rack section, speed downhill is not allowed to exceed 25 km.p.h. (15·5 m.p.h.). The new railcar trains have no rack mechanism, and it is one of their principal advantages that with the drive through the adhesion wheels only they can go up the six miles of 1 in 16·6-17·5 at a steady speed of 20 km.p.h. (12·4 m.p.h.) without the slightest difficulty, although the grade resistance alone is equal to 134 lb. per ton. The line rises to a maximum height of 946 m. (3,100 ft.) above sea level, and at this altitude the engine output is reduced by about 9 per cent. The summit, at Stambulčić, is approached on each side by sharply-curved grades of 1 in 55 maximum, and on these the railcar-trains can maintain the maximum permissible speed of 50 km.p.h. (31 m.p.h.). The temperature varies from 30° F. below zero in winter to 104° F. in summer, but the range in a normal year is from 95° F. to 4° F. below zero.

There is talk of reducing the overall time as soon as sufficient experience in normal operation has been achieved, but when going over the route in the diesel

TIMETABLE OF BELGRADE-DUBROVNIK RAILCAR SERVICE.

5.35	dep.	Dubrovnik	arr.	23.04
6.02	arr.	Uskoplje	dep.	22.37
6.03	dep.	,, ...	arr.	22.36
6.17	arr.	Hum	dep.	22.22
6.18	dep.	,, ...	arr.	22.21
*	arr.	Ravno	dep.	21.37
7.01½	dep.	,, ...	arr.	*
8.10	arr.	Gabela	dep.	20.28
8.11	dep.	,, ...	arr.	20.27½
9.02½	arr.	Mostar	dep.	19.36
9.04	dep.	,, ...	arr.	19.33
*	arr.	Jablanica	dep.	18.20
10.16½	dep.	,, ...	arr.	*
11.02½	arr.	Konjic	dep.	17.33
11.04	dep.	,, ...	arr.	17.32
—	arr.	Bradina	dep.	17.04
—	dep.	,, ...	arr.	*
12.38	arr.	Sarajevo	dep.	16.04
12.45	dep.	,, ...	arr.	15.54
14.19	arr.	Mesici Rogatica	dep.	—
14.22	dep.	,, ,, ...	arr.	—
14.40½	arr.	Ustiprača-Gorazde	dep.	14.03
14.41	dep.	,, ,, ...	arr.	14.02
15.16½	arr.	Višegrad	dep.	13.27
15.18	dep.	,, ...	arr.	13.25½
17.06½	arr.	Užice	dep.	11.37
17.08	dep.	,, ...	arr.	11.35½
18.34½	arr.	Ljubič	dep.	10.09
18.36	dep.	,, ...	arr.	10.07½
*	arr.	Ugrinovci	dep.	8.59
19.44	dep.	,, ...	arr.	*
20.42	arr.	Lajkovac	dep.	8.01
20.43	dep.	,, ...	arr.	7.59½
22.41	arr.	Belgrade	dep.	6.29

* Conditional stop.

train we formed the opinion that until the track is brought thoroughly up to date any acceleration would considerably decrease the passengers' comfort and might lead to a decrease in patronage. At the moment the track comprises flat-bottomed rails of 9 to 10·5 m. (29 ft. 6 in. to 34 ft. 6 in.) length, and with a nominal weight of about 22 kg. per m. (44½ lb. per yd.), but there are a number of old rails taken from the standard gauge main lines.

At the moment all seven trains are not in regular operation, but when they are an accelerated service is to be introduced between Slavonski Brod and Sarajevo, giving a connection at Sarajevo with the Belgrade—Dubrovnik diesel train, and providing a shorter route from Central and East-Central Europe to the southern part of the Dalmatian coast. For the present Belgrade—Dubrovnik daily service a car runs from Belgrade to Dubrovnik in a day, lies over for a day, and the next day returns direct to Belgrade. Four cars are necessary, and over the basic four-day period run a distance of 1,370 km. (850 miles) a car; a fifth car is stationed at Sarajevo as a spare.

Railcar-Train Characteristics

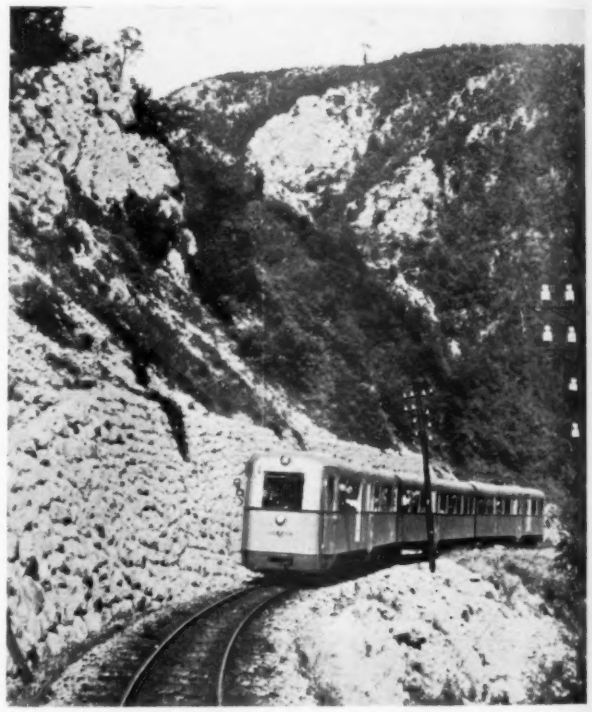
Each train consists of a railcar at each end with a trailer between; a single engine is installed in each end car and drives all the axles of that car, thus giving an adhesion weight of over 70 per cent. of the total tare weight of 64 *tonnes* or of the gross weight of 74 *tonnes*. The maximum axle-load is 7·5 *tonnes*. Over the more level sections of the line one of the two 240-b.h.p. engines is enough to drive the train at the top speed allowed, and on the more difficult sections the two engines can maintain the top permissible speed. Over no section is the speed limited by lack of engine power.

The engine output of 7·5 b.h.p. per *tonne* of tare weight, or 6·5 b.h.p. per *tonne* of gross weight, has proved sufficient to give a very rapid acceleration. On the level the normal acceleration is from rest to 30 km.p.h. (18·6 m.p.h.) in 15 sec., and from rest to 60 km.p.h. (37 m.p.h.) in 82 sec. and 800 m. (874 yd.) with gear changes at 12, 22, 30, and 43 km.p.h. (7·5, 13·7, 18·6, and 26·6 m.p.h.). On a reverse-curved 2·5 per cent. grade acceleration from rest to 40 km.p.h. (24·8 m.p.h.) took 102 sec. and a distance of 750 m. (820 yd.). The maximum designed speed of the railcar-train is 70 km.p.h. (43·5 m.p.h.) and the attainment of this on the inaugural run and the cut of 30 per cent. on the time of the fastest steam train led the Jugoslav press to dub the new service "The Mad Sarajevan." With the normal top engine speed of 1,250 r.p.m. the track speeds given by the five-speed gearbox are 15, 22·5, 32·5, 47·5, and 66 km.p.h. (9·3, 14, 20·2, 29·5, and 41 m.p.h.). A five-speed gearbox is in itself something of a novelty on a train for a narrow-gauge line, but in providing it in a train with a top speed of less than 45 m.p.h., and over such a line, the designers have shown sound sense, and appreciably increased the traffic performance of the train compared with what could have been given by a four-speed transmission.

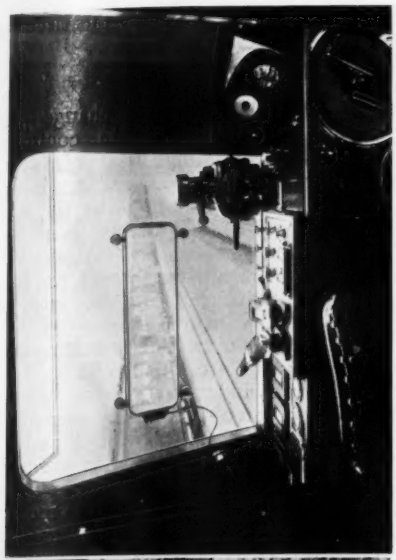
Car Construction

A modification to the normal Ganz layout and construction had to be made because of the extremely narrow gauge, the strictly limited axle-load, and the traction requirements of the steep grades. These conditions necessitated moving the engine from the bogie (as in standard Ganz practice) and mounting it below the underframe, for in addition to considerations of bulk the limitation of the axle-load to 7·5 *tonnes* made it impossible to carry the engine-transmission equipment on one bogie, and with underframe-mounting it was relatively easy to arrange for the drive from the single engine of all four axles on the corresponding power car.

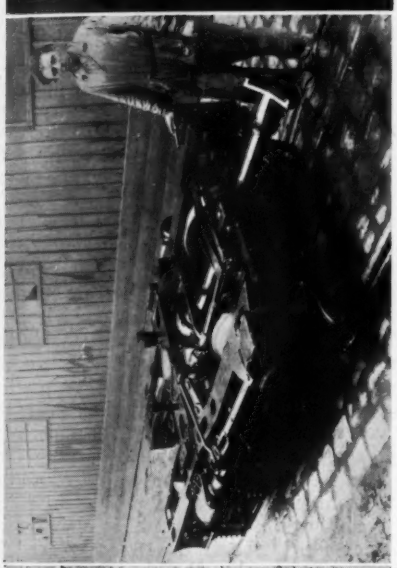
The engine, main clutch, reversing gears, and gearbox are mounted on a special auxiliary frame suspended in a flexible manner from the main underframe of the power car between the bogies. The dry-type multiple-plate friction main clutch and the spur-wheel reversing gears are united in a common casing fixed to the engine crankcase. The operation of the reversing gears and the release of the main clutch are effected by means of compressed air, and when not released the main clutch is kept in permanent engagement by means of springs. Behind the engine and reversing gears is the five-speed gearbox, the drive to it being through a cardan shaft with Hardy flexible couplings. The gearbox is of the usual Ganz type with multiple-disc steel friction clutches for each gear step. From the gearbox another cardan shaft leads to gearing on the bogie, which is housed in a casing formed in the bogie centre transom, and which serves to bring down the drive from the level of the cardan shaft to that of the bevel gears on the axles. From this bogie gearing further shafts transmit the torque to each axle. To take up the large angular movement of the bogie on curves, the cardan shaft from the gearbox to the bogie is fitted with one Hardy flexible coupling and one metal cardan joint. Taken generally, roller bearings are used throughout the transmission. The engine itself is of the Ganz VI JaR170/240 type, set to give a nominal output of 240 b.h.p. at 1,250 r.p.m. and with a maximum capacity of 310 b.h.p. at 1,450 r.p.m. At 240 b.h.p. the weight is about 20 lb. per b.h.p., the piston speed 1,800 ft. per min., and the m.e.p. 83 lb. per sq. in. The engine cooling water radiators are mounted on an auxiliary frame of their own. They are set longitudinally down the car and the axis of the engine-driven fan is also in this direction, so that the flow of air turns through an angle of 90 deg. after leaving the radiators.



Jugoslav diesel-mechanical train on an uphill section



Driving position of Jugoslav narrow gauge railcars, showing throttle control, reverse and gear-changing levers, air and electro-magnetic brake handles, and the hand brake



General view of a driving bogie showing the main cardan shaft transmitting the drive from the engine and gearbox mounted on the underframe. Both axles of the bogie are driven

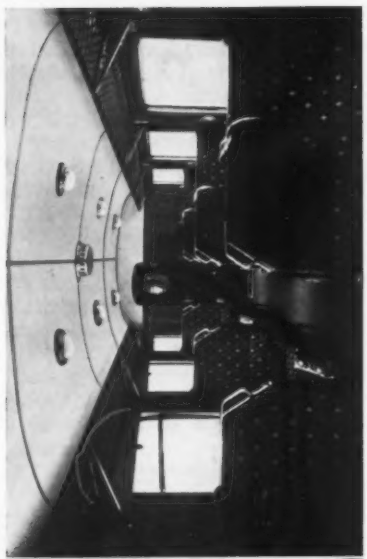
Arrangement of driving bogie of power car looking from outer end and showing the air brake cylinders, and Timken roller bearing axleboxes supported by laminated and helical springs

Construction of the bogies is similar to the Ganz standard type, without bolsters, and with welded box-girder side members and transoms, but in this case both helical and laminated springs have been used. Self-adjusting Timken roller bearing axleboxes are used throughout the train. The wheelbase of the power car bogies is 1·7 m. (5 ft. 7 in.) and of the trailer bogies 1·3 m. (4 ft. 3 in.). Like the bogies, the underframes and car body framing are welded up of chrome steel of 33-39 tons tensile strength, and the body panel plates are of copper-bearing steel. Jugoslav standard centre couplers are fitted at each end of the train, and the inter-car connections are effected by Ganz automatic couplers carrying the electrical and air circuits. Heating of the power cars is normally carried out by the engine cooling water, but for the heating of the trailers, and for heating the power cars during long down-grade runs with the engines idle, a hot air system with a coke-fired heater is incorporated, and this serves also for the preliminary heating of the train. The car windows are made to open and ventilation is assisted by electrically-driven fans in the ceiling.

In the central car are 37 first class seats, a toilet compartment, and a refreshment bar and a small kitchen from which meals can be served throughout the train. In each of the end cars are 37 second class seats, a toilet compartment, luggage room above the engine, and a driving cabin. Removable tables can be fitted between each pair of seats, and they fit round a small ledge hinged to the car side which can be used throughout the journey for pipes, handbags, or similar small articles.

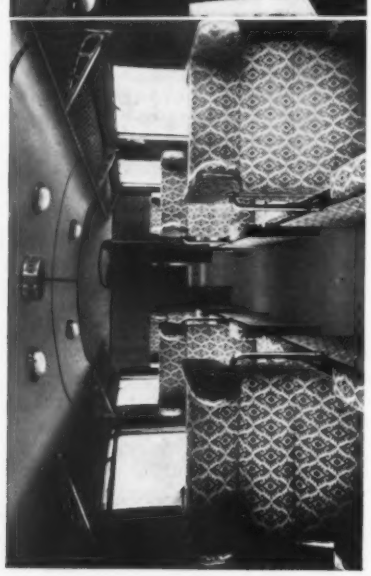
Braking

Compressed air brakes apply blocks on all wheels of the train and can stop the train on the level from a speed of 60 km.p.h. (37·3 m.p.h.) in a distance of 600 ft., and on a 1 in 55 down-grade can stop it in 430 ft. from a speed of 28 m.p.h. The compressor which supplies the air for the brake equipment and the gear-changing controls is driven from the engine crankshaft through a short cardan shaft with flexible rubber couplings and gears. A hand screw brake is also incorporated. But in view of the particularly steep grades a special electro-magnetic track brake has been embodied, not only to provide a reliable and powerful brake independent of the air and hand systems, but also to enable the train to be started easily from a stop on the 1 in 16·6 grade. Owing to the release of the wheel brakes, the train at the moment of release would move backward on the steep grades, so that the engagement of the clutch and the bringing into operation of the starting speed of the engine would require most careful handling. The function of the electro-magnetic brake in this connection is to hold the train from slipping downhill while leaving it free to move uphill, and therefore one of its main characteristics is that the shoes can be slightly displaced relatively to the car, and when the electro-magnetic brake alone is in operation the car will slide back relatively to the shoe, as permitted by spring-equipped stops. In this position the tension of the springs is equal to the force exerted on the train in the downhill direction by the force of gravity, so that in starting it is not necessary to overcome gravitational force, and the starting tractive effort is only that needed to start the vehicle on the level. As soon as the car starts, the assistance provided by the spring stops gradually diminishes, and after a certain travel the rail brake automatically breaks its own circuit by means of the displacement and stops the braking operation. The vertical braking force per shoe is equivalent to a maximum of 4,000 kg. (8,800 lb.), and the total braking force of 32,000 kg. (70,400 lb.) is sufficient for braking and stopping the train on the rack section. The current for the rail brake



Interior of second class saloon located in the power cars. As in the first class saloon, there are two lighting circuits, and electrically-driven fans in the roof

The buffet-bar with, behind it, the kitchen, which are located in the centre car. Light meals are served from here to any part of the three-car train



Interior of first class saloon in the centre trailer car. There are 37 individual seats, and removable dining tables can be fitted between each pair

equipment is supplied by a storage battery; the electrical functioning of the brake is described later.

Remote Controls

The reversing gear, the main clutch, the change-speed gear, and the engine fuel regulation are controlled pneumatically. For this purpose operating air cylinders are provided on these devices as well as in the vicinity of the governor of the engine. The filling of these cylinders with air, as well as their venting, is effected by means of electrically-operated valves receiving operating current through conductors led through the train from the master controller arranged on the front of the car.

For the purposes of changing over to the two directions of travel, the reversing gears are fitted with two air cylinders. For each air cylinder there is an electro-pneumatic valve. The two valves receive the current for their operation through the conductors Nos. 11 and 12. (See large wiring diagram.) Of these two conductors the one corresponding to the desired direction is put in circuit before starting and is kept thus while the car is in motion. To indicate the position of the reversing gear there is a signal lamp switch which connects the leads 136 with the leads of either 11 or 12, depending upon which end position the reversing gear has taken up. Between 136 and the negative pole a signal lamp is inserted, and this lamp lights up as soon as the reversing gear has reached one of the end positions, as of 11 and 12 only one will at any time be in circuit and 136 is in connection with the circuit only when the reversing gear has reached the corresponding end position.

In the position of rest the main clutch is in gear. Its release is effected by placing the air cylinder mounted on it under pressure through the action of the valve controlled from the leads 20. With this valve alone, the air cylinder could only be vented very rapidly, which would lead to sudden engagement of the clutch. In order to enable the air to be removed from the air cylinder gradually, and to enable the main clutch to slip, a further valve is inserted in the circuit, and this is controlled by the leads 18. This change-over valve, the dimensions of which are greater than those of the other valves, in its basic position produces a normal connection between the air cylinder and the end valve operated from leads 20 and renders rapid filling and rapid venting of the air cylinder possible. But if, with the air cylinder filled, the leads 18 are placed in circuit and the change-over valve thereby operated, the air cylinder then gets into connection with the expansion air cylinder, and therefore there is only a partial sudden drop in pressure and the main clutch is operated in a manner that still permits of slipping between the discs.

The expansion air tank communicates through a needle valve with the atmosphere; the pressure ruling in the air cylinder continues to drop after the rapid diminution following the operation of the change-over, and allows the locking spring of the main clutch to compress the discs gradually with full force. If the effect of the engagement of the main clutch is not sufficiently rapid, it is possible to accelerate it in such a manner that the conductors 18 and 20 are simultaneously disconnected from the current supply for a short time, thus enabling part of the air contained in the air cylinder to by-pass the expansion air tank and the needle valve and escape into the atmosphere through the valve controlled from 20. The other two leads 18 and 20, are disconnected from the current supply by means of a slip push button, which breaks the contact points 51 and 63.

The speed change-over switch is operated by five air cylinders of which two always stand under pressure, viz., at speed No. I those marked " slow " and " I-II "; at

speed No. II those marked " rapid "' and " I-II "; at speed No. III those marked " slow " and " III-IV "; at speed No. IV those marked " rapid " and " III-IV "; and finally at speed No. V those marked " rapid " and " V." For each of the above cylinders there is a valve receiving the operating current from the leads 13-17.

Fuel admission to the engine is controlled by a triple-piston air cylinder. The cylinder has three valves which receive the operating current from the leads 21, 22 and 23. From the various combinations of the three valves there result seven positions of the fuel admission controls, viz., step I by means of leads 21; step II by means of leads 22; step III by means of leads 23; step IV by means of leads 21 and 22; step V by means of leads 21 and 23; step VI by means of leads 22 and 23; and step VII by means of leads 21, 22 and 23. Step I supplies the no-load speed of about 350 r.p.m.; step II the shifting speed of about 800 r.p.m.; and steps III-VII control the fuel admission when the engine speed is between 800 and 1,250 r.p.m.

The valves and control members enumerated above are operated from the master controller, in which there are 5 controller drums and 9 push buttons. One controller drum, composed of two parts, serves for the control of the fuel admission, notably the three-finger drum (29, 61, 23) arranged in the central part of the axial spindle and the four-finger drum (22, 65, 61, 21) arranged at the end of the axis. The three-finger drum is composed of a single cylindrical body and the four-finger drum of two cylindrical bodies. The second controller drum serves for operating the change-speed gear and the main clutch, and also effects the connection of the positive pole for the distance thermometer instrument and the sanding push button. On the drum the contact segments are connected from finger 51 up to fingers 60 or 18 respectively; this forms a cylindrical body, with the exception of the position A in which the cylindrical body corresponds to the fingers 20, 18, 63, and is fixed separately from the others. A separate ensemble is formed by the cylinders corresponding to fingers 56, 54, 53, and to the fingers 29 and 22.

The third controller drum brings into the current circuit the leads controlling the operation of the reversing gear, and also effects the connection of the voltmeter, calibrated for speeds in both directions of travel, with such a polarity as to ensure that the beat of the needle should be in the correct sense. (11, 10, 12, 73, 74, 80, and 75). The fourth controller drum is the negative drum operated by the speed-changing drum and effects the connection of the negative poles of the various measuring instruments—24, 64, 66, 67, 69, 70, and 80. The fifth drum operates the dead-man control equipment, 60 and 82.

The positive leads of the battery housed on the trailer located between the two railcars of the Jugoslav trains, are coupled through the terminals connecting the two cars to the + terminal of the jumper box provided on the underframe of the railcar. From this + terminal the source of current is the leads 50, passing through the main fuse of the control gear to the five-pole fuses on the driver's table. Through the fuse the current passes through leads 51 to the terminal board in the master controller, where it becomes divided into two branches, serving on the one hand as a source of current for the change-speed drum, and on the other hand as a source of current for the fuel admission change-over switch and for the slip push button.

The deflection of the handle of the change-speed switch of the master controller from the position marked *O* into the position marked *y* results in the following alterations of the connections. The interlocking plate which closes the push buttons becomes displaced, and enables the push buttons to be operated. On the change-speed drum the finger 52 causes the fingers 65, 52, 60, 20, and 18 to come into circuit and at the same time the finger 56 causes the fingers 54 and 53 to be brought into circuit through the fuse 56 arranged on the driver's table. By turning the change-speed drum, the negative drum is also put into circuit, and connects the fingers 24, 64, 66, 67, 69, 70, and 80 to the negative pole.

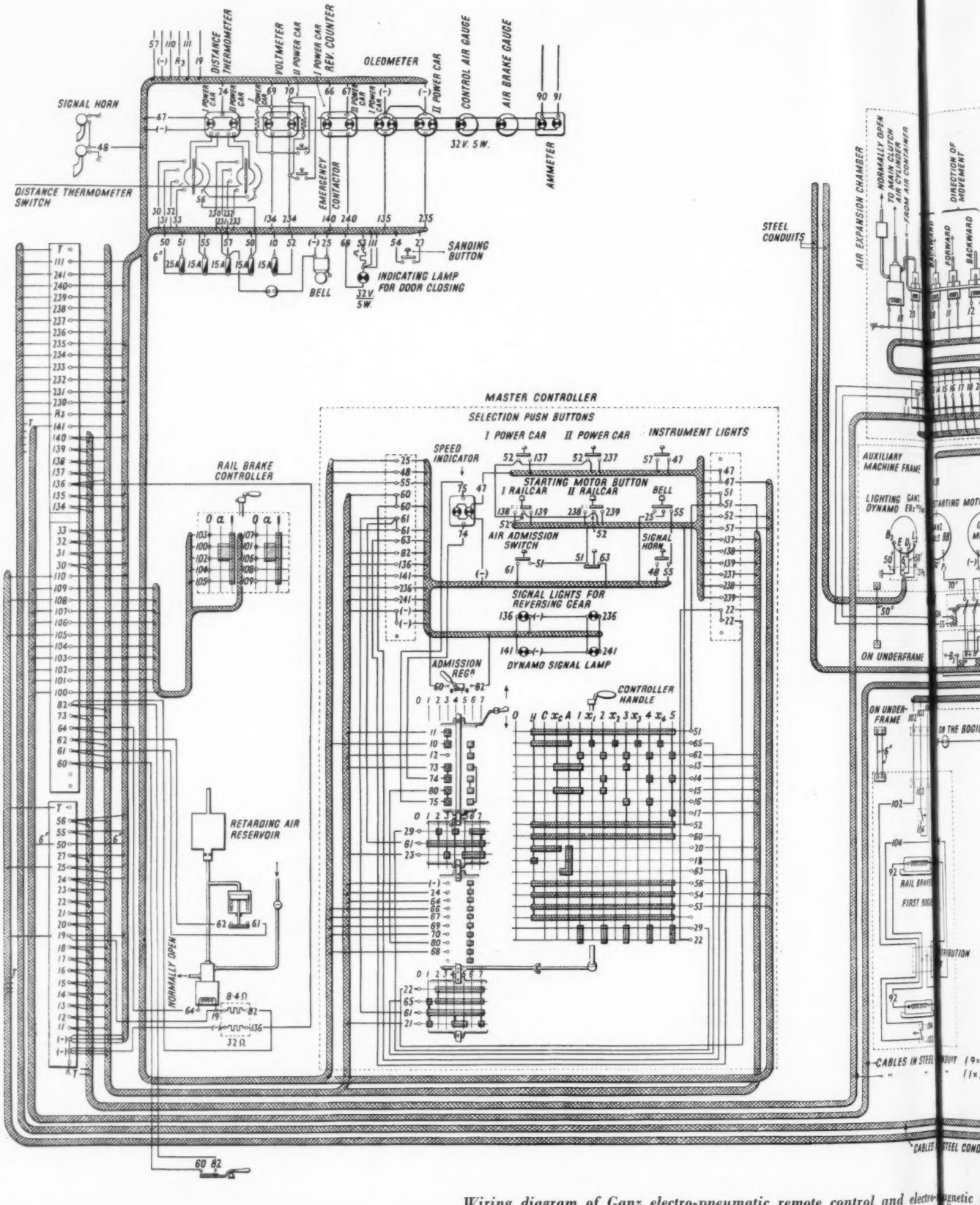
By pushing the selector push button I, the railcar is put into operation, and the following connection is established. From the point 51 of the main drum current is led to the point 52; the latter becomes connected through the push button with 137, which passes through the terminal board provided on the driving dashboard to the terminal board arranged in the valve box, and passes from there partly to the multiple coupler arranged on the car end and partly through the minimum oil pressure and disconnecting device, in the form of leads 85 to that coil of the selector valve which is connected thereto.

Engine Fuel Control

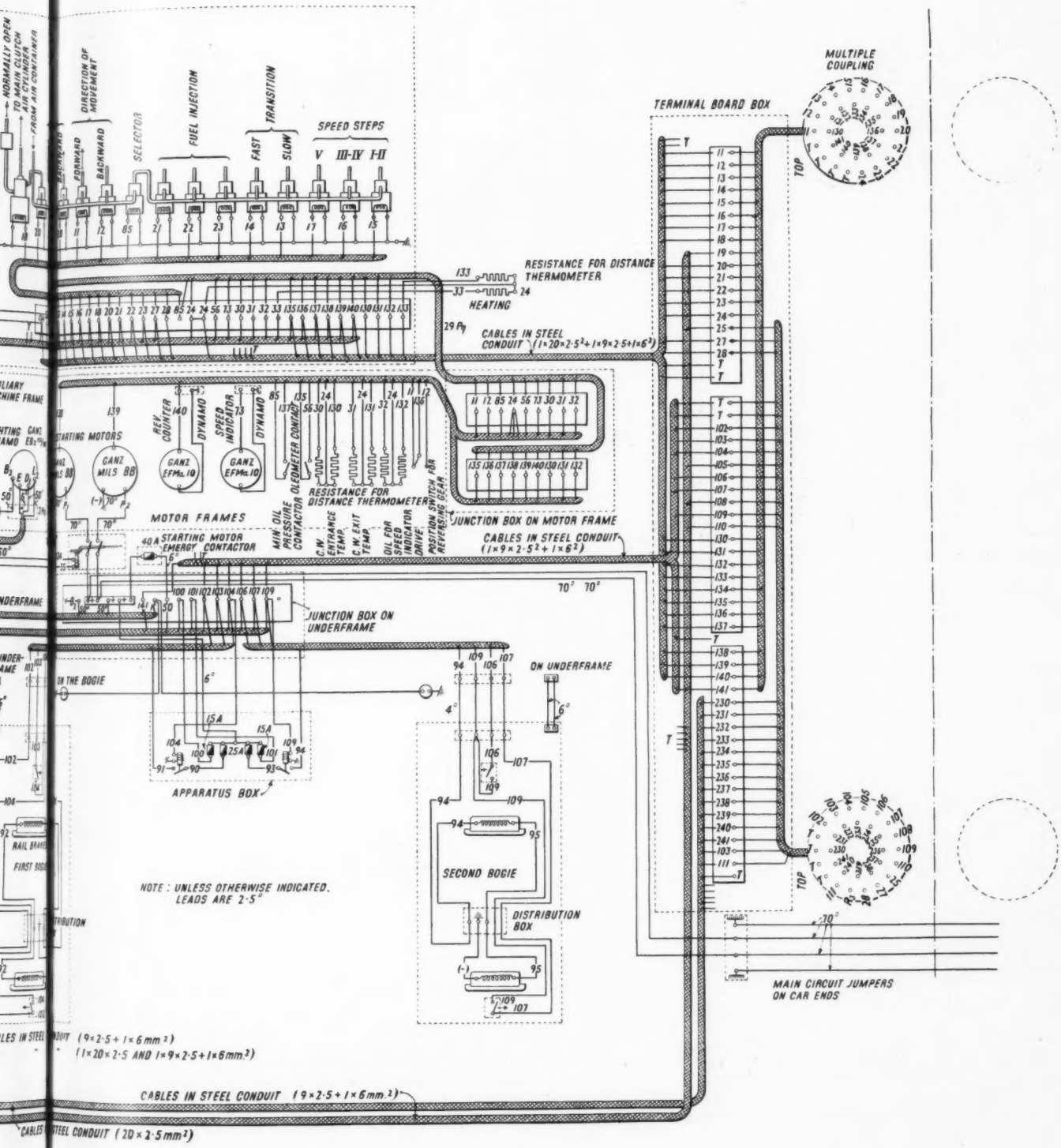
The three valves operating the fuel admission control as well as the five valves serving the operation of the speed-changing switch receive air through the selector valve. By turning the handle of the fuel control device the corresponding fuel admission valve is operated. In the position C, *x* and A it is possible to give a fuel admission corresponding only to engine speeds up to 800 r.p.m. A greater degree of fuel admission would not enable the acceleration to be increased, but would only increase the speed and, together with the latter, increase the stress from friction to which the main clutch would be subjected. Accordingly, if the handle of the fuel admission control device is placed in the position II the point 65 of the fuel admission control drum will be placed in circuit through the leads 65 of the main controller drum. This point is connected with the leads 22, which set the valve 22 in circuit and the engine will receive a degree of fuel admission corresponding to a speed of about 800 r.p.m.

If the rotating sleeve of the starting motor push button is now turned into the desired position (I, II, or I-II) and the push button itself is pressed, the starting motor will be brought into circuit. Provided that the rotating sleeve is in the position I, when the starter button is pressed the leads 2 are connected with leads 138 which pass through the terminal board going on one hand to the multiple coupler provided at the end of the car, and on the other hand bringing into circuit the coil of the contactor installed in the starting motor I, which coil closes the series circuit coming from the battery through an emergency circuit breaker. The making and breaking of the starting motor circuit can be observed on the voltmeter. If, owing to some fault, the starting motor switch should fail to trip (which fact can be detected from the voltmeter), the current is interrupted by means of the emergency circuit breaker.

In the operating circuit of this breaker, the negative leads of the voltmeter in the driving position are the mains 69 and 70, which are connected with the negative on the negative controller drum only if the master controller has been turned from the position *O*. Thus, the voltmeter is connected only to that driving position actually in use. With these mains the operating coil of the starting motor relay is connected in series before the leads are connected to the corresponding battery. Tripping is effected by short-circuiting the voltmeter in question by means of the corresponding push button. Referring to the large wiring diagram, the current in this circuit passes through the fuse 55 and through the terminal board to the point 55 of the circuit breaker, through the coil (with a resistance of about 2·6 ohms) to the leads 134, which continue from the volt-



Wiring diagram of Ganz electro-pneumatic remote control and electro-magnetic



…d electro-magnetic brake, *Jugoslav State Railways' diesel-mechanical railcar-trains*

meter as leads 69 to the point 69 of the negative controller drum where they are connected with the negative. The starting motor circuit-breaker can be switched back by hand by means of the two push buttons incorporated in it. To prevent the voltmeter receiving too large an inductive current shock when the push button is released, it is bridged-over by means of a 500-ohm resistance.

For checking the revolutions per minute of the engine a revolution counter dynamo is provided. From the dynamo the leads 140 pass to the driving dashboard where they are connected with the voltmeter calibrated for numbers of revolutions per minute. To ensure that the dynamos will always feed only a single voltmeter, the controller in the *O* position breaks the connection between the negative leads 66 and 67 and the negative pole. To check the oil pressure of the engine a contact pressure gauge is used. From the point 56 in the driving controls the corresponding point 56 of the oleometer contact is brought into circuit and when closed also brings into circuit the point 135, which is then connected to the terminal 135 of the oleometer provided in the driving position and is connected by means of the oleometer to the negative pole.

Should the desired minimum oil pressure not be available (*e.g.*, in case of a bearing failure) another minimum oil pressure circuit-breaker is provided, which—as already mentioned above in connection with selection—breaks the selector lead circuit and prevents the operation of the railcar.

When the controller handle is in the position *y* the leads 52, which serve as a source of current for the selector and starting motor push buttons, and the action of which in those circuits has been described already, connect the push button with the controller terminal board, and thence the fuse provided in the driving position serves, in the form of leads 10, as a source of current for the operating valves of the reversing gear and for the leads 11 and 12. The changing-over of the handle of the reversing gear, *i.e.*, the reversal of the direction of motion, is possible with the engine at rest in the controller position *y*, or with the engine running, in the position *C*.

Dead-Man Equipment

Leads 60 serve as source of current for the dead-man equipment, viz., for the dead-man switch operated by the fuel control handle of the master controller, and for the dead-man pedal connected to it in parallel. By pressing the handle or the pedal, current passes from the point 60 to the leads 62 which bring into circuit the coil of the dead-man valve through a series resistance and through point 19; the circuit of this coil is closed through 64 and through the – connection if the controller is changed from the position *O*. The dead-man valve forms a change-over valve which, as already mentioned in connection with the main clutch, in its normal position closes the passage to the atmosphere and prevents the admission of air, in the present case by means of a delay air tank and a pneumatic valve. Should the above circuit be closed, the valve in question stops the admission of air and connects the delay air tank and the pneumatic valve with the atmosphere. The spring of the pneumatic valve effects the mutual connection of the leads 61 and 62. From the point 51 on the main controller drum, the leads 20 and thus the air inlet valve of the main clutch and also the leads 18 of the change-over valve, are brought into circuit. Thus in the controller position *y* the main clutch is still closed.

If the speed controller is turned into the position *y* the current is cut off from the leads 18 and the change-over valve passes into its normal position and allows air to pass into the air cylinder and thus release the main clutch. In the following position, *x*, the leads 13 and 15 are brought into circuit, and this corresponds to the speed I already mentioned when describing the change-speed gear. In the next position, *A*, the finger 18 is again brought into circuit, not through the main drum of the controller but by means of the slip push-button, in such a manner that when the contact 51 of the push-button is in its normal position it is connected with contact 63, which brings into circuit the leads 18 and 20 through the leads 63.

If, while in the controller position *A* the speed increases to a certain figure, about one-half of speed I, it is necessary to pass on to position I, where the air cylinder of the main clutch becomes entirely vented owing to the interruption of the circuit through leads 18, 20 and 65. Leads 62 are brought into circuit, and leads 61 form the source of supply, through the contacts 61 and 62 of the dead-man pneumatic relay, to the cylinder of the fuel admission regulator. Under these conditions acceleration can be effected with the fuel lever entirely pulled out and with full engine torque.

If with rising speed the engine has reached the full r.p.m., it is necessary to pass from position 1 into position *x* between I and II, and here, by the cut-off of current in the leads 13 and 15 the air cylinder of the change-speed switch I-II and of the " slow " axle switch become vented. Depending upon the position of the fuel lever, either fuel control cylinder 21 or 23 also is vented by the cut-off of current in the leads 62. In this position the leads 65 are again placed in circuit, and, through the admission control device, brings into circuit the leads 22 and thus the engine speed falls below the figure 800 determined by the valve 22. As soon as this has been done, changing-over to position II is effected. On one hand this causes the leads 14 and 15 to be brought into circuit, and thereby the shaft coupling the " rapid " and I-II positions of the change-speed gear is brought into operation, and on the other hand the circuit through leads 65 is broken, and the leads 62, 21, 22 and 23 are once more brought back into circuit and allow full fuel admission to be given to the engine. In a similar manner the transition to speeds III, IV and V is effected. From the above it will be realised that in the neutral positions *x*, the engine speed drops automatically to about 800 r.p.m. In certain cases, *e.g.*, engaging gears again after coasting, or changing-over to a lower speed when striking an up-grade, it is necessary to increase the speed above 800 r.p.m. before bringing into operation the speed-changing switch. This is done by pressing the push button of the fuel admission change-over device which by-passes the drum of the speed controller, and connects leads 62 with leads 51, which are the source of current. After having been operated this push button remains pressed down, but if and when the speed has reached the desired figure, and is put in gear, the push button is automatically returned to its original position.

If in any position the handle and the pedal of the dead-man device are released the change-over valve fed from the leads 82 is cut out of circuit and air is admitted into the pneumatic relay of the dead-man device. The air compressing the piston of the relay against the spring interrupts the connection between the leads 62 and 61 whereby all three valves of the fuel admission control cylinder are cut out of circuit and fuel is shut off from all the engines on the train. The pressure of the air admitted to the brake valve of the automatic brake increases slowly through the action of an intermediate throttling member and delay tank, so that braking takes place with a certain adjusted delay. In those positions of the speed-changing cylinder in which the speed switch is not in circuit, the drum brings into circuit the leads 65 which are not led through the dead-man relay, and this allows the engine to run at a speed of about 800 r.p.m. (with the aid of

the valve operated from the leads 22), if the dead-man handle or pedal is not pressed down. This can only be done with the train standing, and if the handle and the pedal are released, the brake operates under this condition also.

The dead-man device is connected with the handles of the emergency brake of the train in such a manner that if any emergency brake handle is pulled the leads 19, passing through the length of the train, become connected with the negative pole. The leads 19 represent the positive terminal of the change-over valve connected in series with the series resistance. On the connection the coil is short-circuited, the valve is cut out, and the same sequence takes place as when the handle and pedal of the dead-man equipment is released.

Miscellaneous Train Controls

It is from the leads connecting the master controller with the valve, which run along the whole length of the three-car train, that the various devices along the train are branched off in parallel. The leads are indicated on the diagram of connections by the numbers from 11 to 25. Those leads which serve equipment on one car only are 130-141 and 230-241, the former series being for the first power car and the latter series for the second power car. Of the nine push buttons incorporated in the master controller the functions of four have already been described. The fifth button operates the conductor 48 of the signal horn and connects it to the source of supply, lead 55. The sixth button operates the bell in the driver's compartment by connecting the current supply leads to the bell leads 25 which run along the length of the train. The seventh push button brings into circuit the lighting of the measuring instruments and pressure gauges in the driving cabin, the supply lead 57 being connected to the lead 47 by pressing the button. The eighth button is the selector push button of the second power car. By pressing this a connection is established between the supply leads 52 and the leads 237 which pass through the terminal board to the multiple couplers arranged at the ends of the cars and bring the leads 137 of the second power car into circuit. The ninth button brings into circuit the leads 238 or 239 (from the supply lead 52), which are connected through the multiple couplers with the leads 138 and 139 respectively of the second power car.

In order to check the charging dynamos there are leads from their positive terminals to signal lamps in the controllers, *via* leads 141 and 241 respectively. In each driving position four distance thermometer elements are installed, with leads 130-133 and 230-233. These leads can be connected by means of a change-over switch alternately with the double thermometer instrument. In the driving position which is not in use the change-over switch is kept in the zero position as otherwise the thermometer instrument at the driving position in use will not indicate correctly. The connection between the supply leads 54 on the thermometer instrument and the positive pole is interrupted by the controller in the zero position.

Electro-Magnetic Rail Brake Controls

These Jugoslav railcar trains are fitted with electro-magnetic rail brakes in order to cope with the severe grades and operating conditions. Each bogie of the power cars has two rail shoes, and in order to ensure the highest degree of safety the rail brake system of each bogie is fed from a separate circuit; the coils of the two rail brakes mounted on each bogie are connected in series.

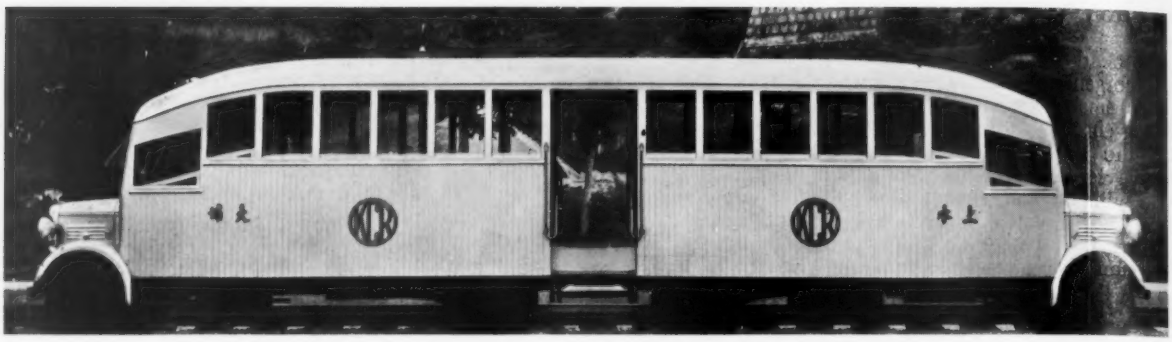
The rail brakes are operated by means of the special controller mounted on the driver's table, and in addition to the 0 position has two others, one marked *a* and the other I. If the special controller is brought into the position I, all the eight rail brakes mounted on the three-car train are energised. The positive terminal of the battery, arranged in the underframe terminal board, supplies the current for the fuses of the rail brake circuits. From there the leads 100 and 101 pass through the terminal boards to the corresponding points provided in the rail brake controller. From the point 100, situated in the controller, the coil of the rail brake switch of bogie No. *1* is brought into circuit through the leads 104. Accordingly the switch connects the points 90 and 91, *i.e.*, the circuit of both rail brakes of the first bogie is closed. In the same manner the finger 101, acting as a source of supply, brings into circuit the leads 109, which close the circuit of the two rail brakes provided on bogie No. *2*. Finger 100 also brings into circuit the leads 105, which pass through the length of the train and bring into circuit the leads 104 of the second power car. From the point 101, the leads 108 are similarly brought into circuit and bring in the leads 109 of the second power car.

The position *a* of the rail brake controller serves to enable the car, when braked on an up-grade by means of the rail brake, to be started without having to release that brake first, for if the brake was released first the car would tend to slip backwards, and starting would be rendered much more difficult. This feature is of particular value on the very steep grades, up to 1 in 16, of the Belgrade—Sarajevo—Dubrovnik line. A gap of about 20 mm. is provided in both directions between the rail brake and the lever transmitting the braking force to the bogie, and in the non-energised condition the rail brakes are kept in the middle position by a spring. If the train is braked on an up-grade by means of the rail brake, the gap of 20 mm. is situated on one side, otherwise the train slips back on the rail brakes. With a slip back of 20 mm. a switch on each bogie is closed, and leads 102 and 104 on the first bogie are connected, and leads 106 are connected with 109 on the second bogie. If when starting on an up-grade the brake controller is returned into the position *a* the energising circuit of the brake switches is interrupted by means of the leads 100, 104 and 101, and 109, but the switches connected in parallel with these circuits remain closed.

With the supply lead 100 of the brake controller connected with the lead 102 in the *a* position, and thus to the terminal 102 of the switch mounted on the bogie, the last-named is closed and effects the mutual connection of 102 with 104, the latter line becoming closed with the negative pole through the energising coil of the brake switch. The position is similar with the leads 101-106 on bogie No. *2*. The leads 106 become closed with 109 through the switch, and 109 is through the coil negative. In a similar manner the rail brake circuits of the second power car are closed, as the leads 102 and 106 are carried down the train. At starting, when the bogie has a back slip of 20 mm. relative to the rail brake which of course is gripping the rail, the switches mentioned above rupture the circuit of the rail brake switch and the rail brakes are released.

AMERICAN MISCELLANEA.—The Warrior River Terminal has ordered a 900 b.h.p. diesel-electric locomotive from the American Locomotive Company, and the Grand Trunk Western has ordered an 89-ton 600 b.h.p. locomotive from the Electro-Motive Corporation for its Brush Street terminal at Detroit. The Cummins Diesel Engine Corporation has rebuilt for the American Rolling Mill Company a 54-ton straight electric locomotive as a diesel-electric with two Cummins 250 b.h.p. engines. The weight is now 65 tons. Originally the electric locomotive belonged to the Toledo & Western Railroad, in Michigan.

AN IMPROVISED RAILCAR IN CHINA

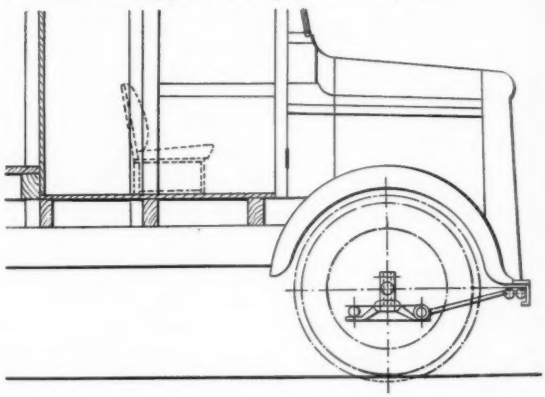


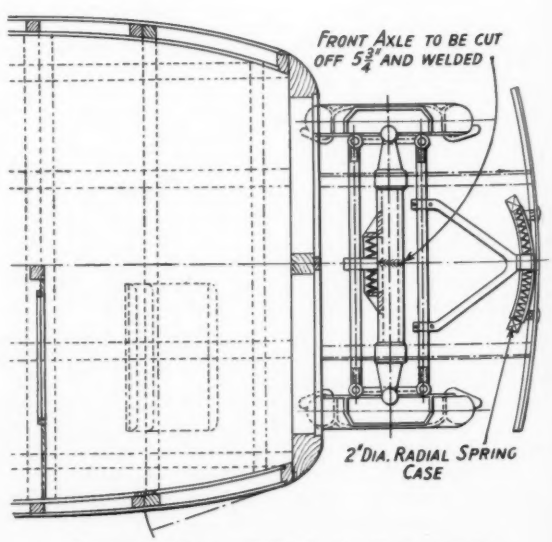
TO counter intensive bus competition on a section of the Kowloon-Canton Railway, between Taipo and Fanling, 5½ miles apart, it was decided to introduce a railcar service. The line is single, with four intermediate stations, and is worked on a token system. Curvature and gradients are fairly severe, the latter being as steep in places as 1 in 100. A fairly heavy express and fast train service between Kowloon and Canton is carried, as well as an hourly local service between Kowloon and Shum Chun, on the border of British territory.

When the shuttle service was proposed it was realised that any engine failure would cause serious disorganisation of the regular service, and that the same speed in either direction would have to be maintained. Various railway companies with railcar experience were asked for advice, but without satisfactory result, and prices submitted by railcar manufacturers were prohibitive owing to the very low fares which it was necessary to charge. As it was essential that the railcar service should begin on April 1 last, time for preparation was strictly limited, and the decision was made to purchase locally two three-ton Bedford chassis, join the frames back to back, and mount on them a locally constructed body; thus the advantage of two independent engines was obtained, so that in case of the failure of one, the railcar should not block the line.

The frames were joined by means of an inner channel; the wheels on the rear axles were removed and a distance liner 1½ in. thick with extension studs was fitted, so as to bring the centres of the wheel tyres to the centres of the rails. The front axles were cut and a piece 5¾ in. long removed from the centre of each. The axles were then electrically welded with butt straps in the I section. The springs were refitted by welding a ½-in. plate 3 in. along the axle. Steel discs were cast and welded to the outer edge of the disc wheels, so that when the flange was ¼ in. clear of the rail the wheel tread was central to the rail. The lower connections to the steering wheels were removed and a double swivel arm and two cross steering tubes fitted to each front wheel. On each rear cross tube a lug was welded to operate on two centralising springs which were attached to a bracket behind the front axle. The first trials showed these centralising springs to be insufficient to prevent a slight wheel wobble at a speed of 30 m.p.h., so a tubular forked bar was fitted to the front cross tube and the front wheel thus became a semi-bissel truck. A centralising spring was fitted in the rear of the front bumper. Notwithstanding these small alterations, the railcar can properly be described as a standard model double British Bedford chassis.

The body, with the exception of the bottom cross timbers and flooring, was built of China fir and Celotex in order to keep the weight down to a minimum. There are longitudinal seats for 34 passengers, and ample luggage space, as the Chinese countryman usually carries as much luggage as he himself weighs. On market days the railcar has carried as many as 49 passengers and their luggage. The railcar makes 10 trips a day in each direction and at the time of writing had been in service over two months without a failure of any sort. The total cost of the railcar was $8,120, of which $1,120 was the cost of conversion. The dollars are approximately 16 to the pound.





Layout of front of Bedford railcar chassis

LETTER TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Railcar Transmissions

Isleworth, July 23

TO THE EDITOR, *Diesel Railway Traction Supplement*

SIR,—We have read with interest the letter from Mr. V. Lehel, of Budapest, published in your issue of July 8, and feel that many of your readers will be grateful for his interesting analysis of the numbers and types of fluid transmissions covered by our graph advertisement " Fluid Transmission is Fundamentally Right." This advertisement is reproduced in the present issue for convenient reference in the same form as before, except that the figures of aggregate horsepower and numbers of units in service and on order have again been brought up-to-date.

Mr. Lehel's suggestion that the graph is misleading cannot reasonably be upheld, since every competent engineer today knows the difference between a fluid coupling and a converter, and each issue of the advertisement gives separately the numbers and horsepower of rail-vehicle applications of fluid couplings manufactured under Vulcan-Sinclair licence, and fluid torque converters manufactured by Voith or under their licence.

He further suggests that some issue is confused by our summing together both types of transmission, but we must point out that this is the tenth year in which we have used the term " Fluid Transmission " in relation to fluid couplings, and more recently torque converters, and they are grouped together for the simple reason that they possess in common the same outstanding advantages for rail traction. That is to say, the drive is engaged without the slightest shock, there is no wear between the working elements, and furthermore the fluid vortex ring forms a perfect medium for cushioning shock and vibration which is permanently interposed in the transmission line. Both couplings and converters are largely used in conjunction with mechanical change-speed gearing, and the logical demarcation is to separate the direct mechanical and other drives from the fluid-mechanical systems, as is done in the advertisement.

The fact that nearly 60 per cent. of the world construction in 1937 of the diesel rail vehicles covered by the graph incorporated couplings or converters according to our system, shows that the above features of fluid transmission are valued in practice by railway engineers, and that the trend is rapidly moving away from the earlier forms of mechanical drive having a rigid transmission line with friction clutch engagement.

Your correspondent suggests that it would clarify matters if the fluid coupling vehicles were transferred to the mechanical transmission group leaving the torque converters separately for consideration. However, the torque converters used in the Voith system and particularly in the larger powers 350/600 h.p. are largely used in combination with fluid couplings and mechanical gearing so arranged as to give three stages of transmission, *viz.*, two ratios of gearing additional to the first stage in which the converter gives automatic variation of the gear ratio. On the other hand, there are cases where fluid couplings are used without mechanical change-speed gearing. Hence there is no clear cut case for treating fluid couplings as mechanical transmissions, and torque converters as fluid transmissions on the lines your correspondent suggests. Fundamentally, they are both " Fluid Transmissions " and are so presented in the advertisement.

Mr. Lehel makes the statement that a fluid coupling " is only a clutch with the same functions as a friction clutch," and this reveals that he cannot have realised a further valuable feature of the fluid coupling which is appreciated by railway engineers. It has been found from careful drawbar tests that because a fluid coupling (or converter) takes up the drive so very smoothly, it is possible when starting on slippery track to achieve regularly an increase of about 20 per cent. above the maximum drawbar pull that is obtainable with the most skilful engagement of a friction clutch under otherwise identical rail conditions and axle loading.

The last part of Mr. Lehel's letter appears to introduce an element of prejudice in suggesting that the success of the Voith converter transmission in the country where it was evolved, *viz.*, Germany, is not really due to technical excellence or economic considerations. He quotes in contrast quite impressive figures of railcars exported in recent years by Ganz & Co. from Hungary, thus conveying the implication that this export business has been placed very largely upon such considerations. The existence of barter trade arrangements and substantial export subsidies by the Hungarian Government is, however, believed by several British manufacturers to account for much of the export railcar business quoted, and if this belief is true then it is clear that considerations of technical excellence and economics of operation would not account for the selection of the mechanical transmissions in question.

As regards the significance of mileage figures, the Ganz mechanical transmission is relatively old, and can, therefore, claim higher aggregate railcar mileages than the Voith converter, particularly since Mr. Lehel rules out of consideration the great mileages of trouble-free service run by high power units on the German State Railway. Similarly, animal transport (*e.g.*, camels) is older than railcar transport, and can claim much higher aggregate mileages through the ages, but no one attaches serious importance to this perfectly true consideration when adopting railcar transportation.

Yours faithfully,

For HYDRAULIC COUPLING & ENGINEERING CO. LTD.
HAROLD SINCLAIR,
Managing Director.

ROUMANIAN SHUNTERS. — Twenty-five four-wheeled diesel-mechanical shunting locomotives are being built for the Roumanian State Railways. They are being fitted with 150 b.h.p. M.A.N. engines and Mylius gearboxes, and will weigh about 24 tons.

NORWEGIAN LOCOMOTIVE.—Mr. Olaf Storsand, Chief Mechanical Engineer of the Norwegian State Railways, tells us that the order for the 3,600 b.h.p. diesel locomotive has not yet been actually confirmed, and that results of trials with a hydraulic transmission set are being awaited.

CYLINDER LINER IRON.—The Sheepbridge Stokes Centrifugal Castings Co. Ltd. have introduced for general application a new all-pearlitic cylinder liner cast iron known as " Loded " iron. It is centrifugally cast and contains almost 1 per cent. of chromium. The natural hardness, which extends right through the metal, is equivalent to 310–330 Brinell.

SOUTH AFRICAN RAILCARS.—The twelve railcars which are being built for the South African Railways by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. are to be 61 ft. long and will accommodate 20 European, 6 non-European, and 21 native passengers, and each class will have separate lavatories. The luggage room will have a floor area of about 75 sq. ft. The engine will be an eight-cylinder Ganz model of the type which is normally rated at 320-350 b.h.p., and with the four-speed Ganz gearbox will be mounted on one of the bogies. There is to be a driving position at each end, and multiple-unit control will be provided.

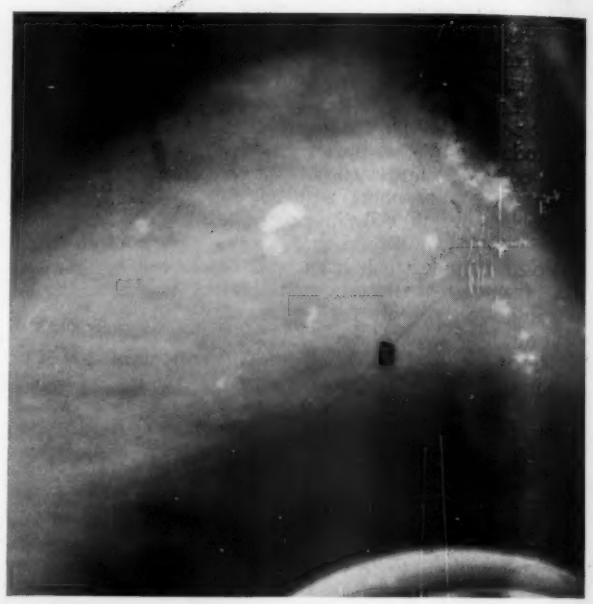
SCIENTIFIC CONTROL IN LIGHT ALLOY MANUFACTURE

Examination by X-rays and micro-photography are used in the routine testing of Hiduminium

IN the production of light-weight high strength pistons, cylinder heads, crankcases, connecting rods and other highly-stressed components of diesel engines, it is essential for rigid control to be exercised at every stage of fabrication, for this provides the only method by which absolute reliability and uniformity can be assured—factors that make for high efficiency and freedom from trouble in service.

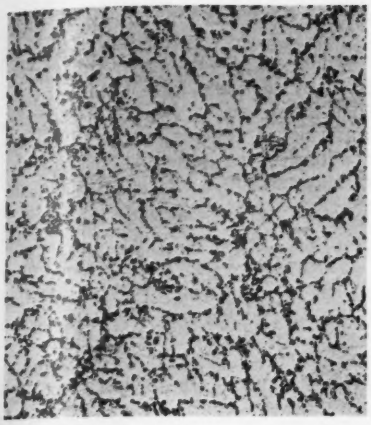
An important section of any such work should always be the routine testing—ultimate strength, proof stress, elongation, fatigue resistance to alternating loads, and so on—of samples from every melt of alloys destined eventually for use as diesel engine components. In addition to careful attention being given to this, an important feature of the control exercised in the manufacture of the Hiduminium high-tensile aluminium alloys at the Slough works of High Duty Alloys Limited is the production radiological examination of castings and stampings. For this a comprehensive X-ray plant has been installed. In the lead-lined rooms in which the X-ray units are housed, light alloy parts are directly examined for flaws and faults within their structure—defects which could be found in no other way. When such faults are present in parts being X-rayed, the rays pass more freely through them than through the perfect sections and are therefore plainly discernible in the radiograph or on the screen used for visual examination.

X-rays do not destroy or injure in any manner the parts tested, and therefore each casting, stamping and forging produced can be examined with their aid. There are certain other tests—such as microexamination—which may involve destruction of the part to be tested. Specimen parts are therefore selected at random after each process of fabrication has been completed. Sections from these are then prepared, polished until they are free from even

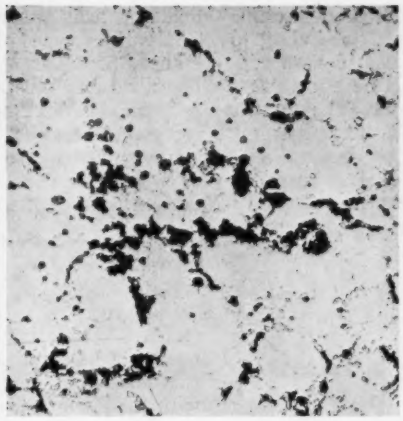


Above: Radiograph of an aluminium alloy casting; the irregular white areas indicate porosity. In order to co-relate the radiographs with the parts examined, a lead letter is laid on the casting before it is X-rayed; this is shown by the dark B

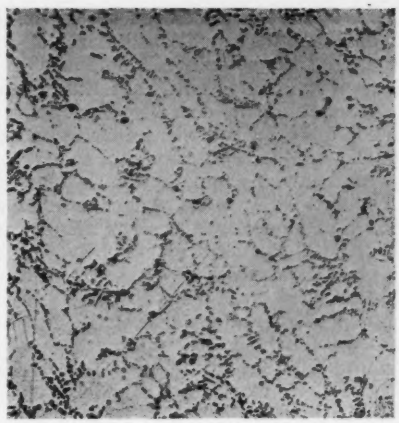
Left: Phillips 50-kVA. X-ray tube for crystallography. By means of this apparatus the atomic lattice structure of crystals can be studied



Photomicrograph of Hiduminium aluminium alloy RR 59 heated to 530° C. and quenched; satisfactory (mag. × 100)



Photomicrograph of Hiduminium RR 59 heated to 560° C. and quenched; shows considerable fusion of eutectic due to overheating (mag. × 100)



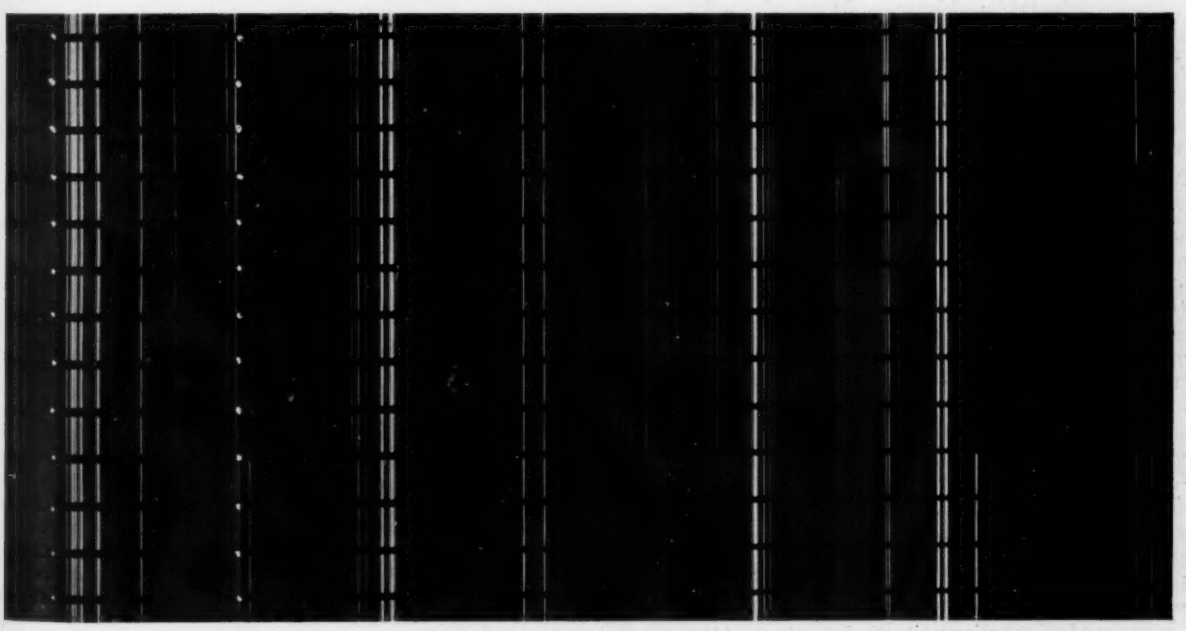
Photomicrograph of Hiduminium RR 59 heated to 540° C. and quenched; this shows slight fusion of the eutectic due to overheating (mag. × 100)

microscopic scratches, and, usually, etched with special reagents which disclose the crystal structure of the metal and enable them to be examined and photographed by means of various types of microscopes which give magnifications of up to 2,000 diameters.

With the aid of these special microscopes the metallurgist can learn far more than is possible from any analysis, however accurate. An analysis will reveal only the constituents of the material analysed; but micro-examination tells *how those constituents are combined* and the temperatures to which they have been subjected, factors which have great effects on the physical and mechanical properties of the metal. Micro-examination as employed by High Duty Alloys Limited provides a certain check on the temperatures to which the alloys are subjected during casting, forging, and heat-treatment.

Closely associated with micro-examination, but even more accurate in its results, is X-ray crystallography. This consists of a further study, with the use of X-rays, of a prepared section of metal, and it permits the structure of the metallic crystals to be studied. Careful examination and checking of the lattice structure and the arrangement of the atoms enables the presence of internal strain in a part, the orientation of the crystals after working, the effects of precipitation treatment, and much other valuable information to be detected.

The latest development in the Slough laboratories is the result of 18 months' intensive specialised work by the research staff. It consists of a special method of employing spectrum analysis for the composition control of Hiduminium alloys. This operates on the principle that when a high tension spark is formed between two electrodes of the material under examination, the light emitted is dispersed according to its various components in the spectroscope, and part of the ultra violet spectrum is photographed. As every element known to science



Typical sets of spectrum lines photographed on one plate by means of spectrograph

has a distinct characteristic spectrum, it is thus possible to discover the exact constitutents of which the alloy to be analysed is composed. Moreover, by the relative densities of the characteristic spectrum lines, the percentages of the constituents can also be determined. The process is not quite so complicated as it sounds, for when the emissions are passed through a spectroscope they are split up and can be photographed as lines, which in turn can be studied with the aid of a micro-photometer.

This method of analysis has been introduced because of the very high degree of speed and efficiency it provides. In practice, samples of every melt of every alloy prepared are arranged to form the two electrodes and the light emitted when the spark is struck between them is transmitted through the spectroscope and photographed. From the resulting spectrum lines the analysis of the metal is measured by means of a micro-photometer.

In addition to the routine scientific control of production, which incidentally includes the testing and analysis of sand and other moulding materials, constant metallurgical research is carried on by a staff of highly-qualified chemists, physicists, metallurgists, and engineers. The laboratories are entirely self-contained. Special electric furnaces in which the temperatures can be exactly controlled and recorded, and which are, in fact, miniature replicas of those used for production purposes, sheet rolling mills, and a machine shop are provided so that all stages of research, from the mixing of new alloys onwards, can be conducted without any interference with everyday production in the works.

Much equipment similar to that previously described is in constant use by the research staff. X-ray crystallography and micro examination, for example, play a big part in producing the alloys of which tomorrow's diesel engine components may be made, for an examination of a photomicrograph of an experimental alloy, or of one that is in normal production, may suggest that if slight variations were made in methods of treatment, a metal would be produced possessing even better properties than those now in use.

Publications Received

The Diesel Engine. By A. Orton. London: Sir Isaac Pitman & Sons, Ltd. 121 pp. 5 in. by 4¼ in. 31 figures. Price 2s. 6d. net.—The eminently handy little Pitman's technical primers on numerous technical subjects have attained, under the editorship of Mr. R. E. Neale, a high level of usefulness from which none of the volumes is allowed to depart, and this fourth edition of the work on diesel engines is thoroughly suited to the needs of the engineering student or of the steam engineer who finds himself being "dieselised." The thermodynamics of the oil engine are simply but adequately explained, and as far as is possible in a small book, the descriptions of the main and detailed construction are spread over all types of engine. Although there is no special emphasis on rail traction engines, the author has not neglected his wide knowledge of that field in picking on certain details for explanation and illustration. The book finishes with what every primer should finish with—a comprehensive and up-to-date bibliography.

Holzgas-Generatoren.—Wien, 1: Julius Springer, Schottengasse 4. 105 pp. 8¼ in. by 5¾ in. 88 figures. Price RM. 5.—Only the ultra-nationalist ideas of economic independency which have been rife within the last few years could have brought the producer gas systems into the realm of rail traction unit. This book, the 20th publication of the Oesterreichisches Kuratorium für Wirtschaftlichkeit, deals only with generators using wood fuels. The various types of Central European producers, such as Hansa, Semmler & Vedder, Kromag, and Gruert, are described and illustrated by sectional drawings, and their performance discussed. Charts are given of the capacity, temperatures, gas analysis, and efficiency at various loads, and there are sections on the fundamental principles of wood gas production and the means of testing the performance of the different types of generators.

Motorzugförderung auf Schienen. By Otto Judtmann. Wien I: Julius Springer, Schottengasse 4. 286 pp. 9½ in. by 6¼ in. 108 figures. Price RM. 24.—To those engineers, deep in the study of railcars or diesel-engined locomotives, who are familiar with German, this book will be a delightful "find." True, it is not bound in the celebrated black leather with gilt letters associated with the Berlin house of Springer, and has been turned out into the world with merely a paper back. But once inside the covers there is little to cavil at, for the material is good and is well up to date. The whole book is liberally sprinkled with bibliographic notes, which alone are of considerable use, and help to get over the main defect of the book, which is the limitation of its contents to Central European practice, particularly in the engine section, where only the Maybach and Simmering vee engines are illustrated and described. The torque characteristics and fuel consumptions of Otto and Diesel cycle engines are discussed in some detail, but unfortunately little attention has been given to supercharging. The theory and characteristics of the different classes of transmission—mechanical, hydraulic, and electric—have been treated thoroughly, but only the German Mylius and Ardelt types have been described, and the sectional drawing of the former is by no means of the latest type, although it illustrates well the basic principles of the construction. The hydraulic transmission chapter is confined to an examination of the construction, efficiency, and operating characteristics of the Voith type of drive, except that fluid couplings of the Vulcan-Sinclair type are dealt with here in preference to the mechanical transmission section. Forty pages are allocated to electric transmission and a pleasing feature of that section dealing with the characteristics of the various control systems (B.B.C. servo field regulator, Lemp, R.Z.M., and the like) is that the author does not try to boost the Gebus system, of which he is joint inventor. Of particular interest are the chapters dealing with the performance on the line of the different patterns of railcars, and resistance, acceleration, normal running, and braking are all given adequate consideration, as is the fuel consumption in service as distinct from that on the engine test bench. Considerable attention is given to the testing and correct comparison of railcars, but because of the geographic limitations which appear to have governed the text, such important methods as the Ferrand-Rousselet are excluded. Despite these shortcomings, and partly because of what an English engineer would style its "mathematical" flavour, the book is a real advance in the literature of railcar traction.

Speed Indicators.—With the spate of record runs during the last five years and the general high speeds of normal express railcar workings, a reliable speed indicator is a necessity, not a luxury. The types available are not legion, and indeed can virtually be counted on the fingers of one hand. The Teloc design, in both its recording and non-recording forms, is described and instructions for the maintenance given in a 67-page booklet issued by the Hasler Telegraph Works, of London, S.W.1. Among notable diesel vehicles fitted with this type of instrument is the 4,400 b.h.p. diesel-electric locomotive of the Roumanian State Railways.